



3 1761 00827246 0













# ICONES PLANTARUM FORMOSANARUM

NEC NON ET

CONTRIBUTIONES AD FLORAM  
FORMOSANAM.

IV.

---

AUCTORE

**B. Hayata.**

QK

369

H3

v. 4-5

## INTRODUCTION.

As was stated in the third volume of this work, several more volumes were to be devoted to the results of studies of new materials which were then on my hands. The first part of these studies was published in Vol. III. under the heading, "Contributions to the Flora of Formosa, Part I." The present volume is principally devoted to the second part of the same studies. It also contains some plants collected during my last excursion to Formosa, in the spring of this year.

The volume contains 285 species and several varieties, of which 167 are proposed as new species, and 9 as new varieties of known species, while 118 are identified with species which were known from the island or from other countries. Of genera contained in this volume, one genus, *Arisanorchis*, is proposed as new, and thirteen genera are mentioned as new to the flora of the island. The genera new to our knowledge of the flora are shown in the following list.

<i>Aconitum</i>	<i>Moneses</i>	<i>Cryptostylis</i>
<i>Ailanthus</i>	<i>Boschniakia</i>	<i>Cystopteris</i>
<i>Corylopsis</i>	<i>Beilschmiedia</i>	<i>Leucostegia</i>
<i>Modecca</i>	<i>Hydrocharis</i>	
<i>Cornus</i>	<i>Arisanorchis</i>	

Genera,\* species\* and varieties\* now to be added to the flora of Formosa number as many as 13 genera, 194 species and 9 varieties. Thus, up to the present date, the total number of species of the flora, so far as is known, is 3112, belonging to 891 genera and 158 families.

In the present volume, floral sketches of some of my species already described are given, and the original descriptions are repeated, as I desire to give a clear conception of my species to any one who examines them to see whether they are to be recognized as genuine new species or to be reduced to known species.

Of the species mentioned in this work, I have proposed more than

---

\* It should be understood that plants outside of the island are not counted in this number, although they are mentioned in this volume.

half as new. In so doing, I shall be accused of having described too many new species, and shall be censured for having paid but little attention to known species. But such is not at all the case. I have, as far as necessary, consulted all accessible literature bearing on my work, and have made exhaustive comparisons with all the herbarium specimens preserved in our institutes at Taihoku and Tōkyō. It should be understood, as I stated in my former paper,\* that our herbaria are as yet very inadequate for the working up of my materials which are really extensive. It frequently occurs with us that foreign herbarium specimens for comparison being very scanty, we are compelled to consult original or reproduced descriptions, instead of herbarium specimens themselves.

In this way have my own investigations been made. I have commenced my work with the utmost care, examining all descriptions of the species with which my plants might be identified. In those cases in which the descriptions of plants under examination were exhaustive or at least available for identification, the work could be carried on with some measure of satisfaction. Much more satisfactory has it been when they were accompanied with figures. When, however, the descriptions were very short and imperfect and not accompanied with any figures, the work of identification was utterly disappointing if not impossible. In cases where I could not satisfactorily identify my plants with any known species in consequence of the imperfection of the given descriptions or the want of herbarium specimens, the only work that was possible for me was to describe my plants fully and accurately as new species, giving their affinities. This has been most frequently the case with ferns. As stated by Sir WILLIAM HOOKER,\*\* the identification of ferns with given descriptions is a very difficult task, and in some cases utterly impossible, if the descriptions are not accompanied with figures.

For us to whom comparison with herbarium specimens can be but imperfectly carried out, the most important work to be undertaken is not so much the identification of plants with known species, as the study of their

---

\* HAYATA, B.—Materials for a Flora of Formosa, in Journ. Coll. Sci. Imp. Univ. Tōkyō, XXX-1, p. 2.

\*\* HOOKER, Sir WILLIAM JACKSON.—A second Century of Ferns (1861), p. VII.

characters and affinities. Works which contain full descriptions and illustrations of plants of the regions in question, should present important materials for students of phytogeography and of systematic botany. Works which deal only with the names of plants, perhaps erroneously classified, as would probably be the case in circumstances like ours, would be likely to lead students of phytogeography to erroneous results, and would puzzle students of systematic botany with an endless confusion of nomenclature of plants.

In this work, plants, the identification of which has been satisfactorily made, are referred to known species. In this case, I usually have made it clear how I have identified them with the species to which they have been referred,—by means of a comparison of herbarium specimens, of figures or of descriptions found in literature. But in cases in which identification has not been satisfactorily made, plants have been described as new with affinities. In some cases, my species may be the same as those which I have given as their allies under descriptions of plants in question. Therefore, though many of my new species should be reduced to synonyms, still I have little doubt that my work will present important material to students of the flora of Eastern countries. No one is more conscious than I that errors may have crept into my work; but the errors in most cases are of a nature inevitable in work of this kind done in the East, far from Western herbaria, and will doubtless easily be detected by those who are familiar with the species, when they see merely my descriptions and figures without troubling themselves to look at my original types.

As stated above, nothing is more difficult than to identify plants by short descriptions unaccompanied with figures. Original descriptions ought, therefore, to be very clear, accurate and exhaustive, and if possible, ought to be supplemented with figures, so that one can identify one's plants easily and satisfactorily. For one to whom original types are easily accessible, it is not difficult to work with short descriptions, as one may go to see the types themselves, if one finds original descriptions unavailable for identification. But, for one to whom original types are not accessible, when descriptions are too short for use, the work cannot but be very difficult and

sometimes impossible. Exhaustive descriptions are, therefore, indispensable for us to whom herbarium specimens for comparison are not sufficient and types are practically inaccessible.

Descriptions of new species ought to be accessible to all botanists and are necessary, except in the case of those of certain circulation of which types are at hand. Moreover, type-specimens are not things which can be widely distributed; they may be rare, or even extinct. Descriptions, however, when published, can be easily obtained, and the excuse of inaccessibility is not admissible. Accordingly, original descriptions should be so exhaustive that they may be substitutes for type-specimens and that one can work with descriptions in cases where the types are not available. In this sense, Eastern botanists are in no more urgent need of exhaustive descriptions of plants of which types are preserved in Western herbaria, than Western botanists are of those of which types are preserved in Eastern herbaria. The same can be said of all botanists either with reference to different countries or to different herbaria. It is also much to be desired that the multiplication of type-specimens proposed by SWINGEL\* should be carried out by all botanists who have to describe new species. Though the distribution of merotypes is most important for taxonomic botany, yet it is far too difficult, and in some cases impracticable, to make it obligatory on all authors of new species.

Descriptions might be very short so long as the species belonging to the same genus were few in number. As the species increase year after year through the exploration of new territories or other causes, descriptions will tend to become fuller and more exhaustive. In such cases, original descriptions of two or three lines only for the sake of priority should be absolutely avoided.

It is much to be desired that the following resolutions should be considered at the next meeting of the International Botanical Congress to be held in London next year, if the present overwhelming war is then over, viz: (1), that in the case of new species, descriptions of two or three lines only for the sake of priority should be as far as possible avoided; (2), that authors who are compelled to describe new species from imperfect

---

\* SWINGEL, W. T.—Merotypes as means of multiplying botanical types.



specimens should supplement their original descriptions with perfect materials as soon as possible.

As this volume is principally devoted to studies of the Orchideæ and Pteridophyta, a few remarks on the classification upon which the two families is based will not be out of place. In working up my collections of orchids, I have principally followed BENTHAM and HOOKER, sometimes LINDLEY, KING and PANTLING, and PRITZER. As to the classification of Monandraceæ-Acerotonæ, many authorities do not agree. \*PRITZER's system which, taking into account whether the inflorescence is terminal or lateral, distinguishes Acranthæ and Pleuranthæ, or, on the basis of the vernation of the leaves being either convolutive or duplicative, makes many divisions in the above named tribes, proved to be impracticable in working up my materials. Moreover, I have found many doubtful cases, so far as inflorescence being terminal or lateral is concerned, and there are even more cases in which it is impossible to determine whether the vernation of the leaves is duplicative or convolutive. KING and PANTLING's Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. Vol. VIII. and several other illustrations given in the same Annals have been very useful to me in identifying and comparing my collections of orchids.

As to ferns and especially to the genus, *Dryopteris*, I have followed C. CHRISTENSEN's system in his Index Filicum. His classification of the subgenera of the genus\*\* is based principally on the presence or absence of hairs and on their structures. This newly founded system is certainly one of the most natural arrangements and has proved to be easily applicable to Formosan ferns. But, as far as Japanese and Formosan species are concerned, there are a few cases in which I can scarcely agree with the author. Some species which are taken by him as types of a subgenus do not show the characters of the same subgenus, after the delimitation of the latter as stated by him. For example, *Dryopteris Miqueliana* (Max.) C. CH. which is taken as one of types of the subgenus, *Eudryopteris*, which after CHRISTENSEN-

---

\* PRITZER, E.—*Orchidaceæ* in ENGLER u. PRANTL, nat. Pfl.—fam. II-6, p. 76.

\*\* CHRISTENSEN, C.—On a natural classification of the species of *Dryopteris*, pp. 74-76, and a monograph of the genus *Dryopteris* part-1, pp. 61-63.

SEN's delimitation should have no true hair, has true unicellular hair; while *D. Sieboldii* (van HOUTTE) O. Ktze, which is taken as another type of the same subgenus, has true multi-cellular hair. I have no doubt, however, that the two just referred to could be quite naturally assigned to the subgenus named, as might be seen from their general characters. With a very few exceptions, his delimitation of subgenera and classification of the genus are very natural, and I have, therefore, followed his system solely.

As to my new species mentioned in this volume, I have described them as accurately and fully as possible and in almost all cases, save where the number of pages or the want of materials forbade, I have supplemented them with figures, in plates or in the text. Accordingly, I believe that any one who is familiar with the plants in question can at once decide whether my species should be recognized, or should be reduced, without taking the trouble to look at my types. As to ferns, I have added to full descriptions photographs of whole forms and magnified sketches of pinnæ or pinnules, scales and sori. As a type for description, I have taken the largest form possible; for describing pinnæ or pinnules, I have taken basal ones; and for angles of pinnæ, I have taken the middle ones. Great attention has been paid to venation and the structure of hairs.

All the species of phanerogamous plants are here arranged, as in the preceding volumes, after the system of BENTHAM and HOOKER, while those of vascular cryptogamia are arranged after the system of ENGLER and PRANTL. The scope of the present volume is the same as that of the preceding volume.

In conclusion, I avail myself of this opportunity to tender my hearty thanks to the officials of the Government of Formosa to whom I am much indebted for help in the collection of materials and in the publication of this work.

B. HAYATA.

August 31, 1914, Taihoku and Tōkyō.

## ADDITIONS AND CORRECTIONS.

Following corrections are kindly suggested by Mr. OAKES AMES, director of the botanic garden of the Harvard university, to whom I desire to tender my hearty thanks for his painstaking revisions of the orchidious parts of my work.

**Gastrochilus formosanum** HAYATA n.n. *Saccolabium formosanum* HAYATA Mater. Fl. Formos. p. 336; Ic. Pl. Formos. IV. p. 88, fig. 44.

**Gastrochilus Somai** HAYATA n.n. *Saccolabium Somai* HAYATA Ic. Pl. Formos. IV. p. 93.

**Pomatocalpa brachybotrya** HAYATA n.n. *Cleisostoma brachybotrya* HAYATA Ic. Pl. Formos. p. 95, fig. 49.

**Pomatocalpa oblongisepala** HAYATA n.n. *Cleisostoma oblongisepala* HAYATA Ic. Pl. Formos. II. p. 134; et Ic. Pl. Formos. IV. p. 96, fig. 50.

**Pomatocalpa breviracema** HAYATA n.n. *Cleisostoma breviracema* HAYATA Mater. Fl. Formos. p. 338.

**Trichoglottis ionosma** J. J. SM. *Cleisostoma ionosma* LINDL.; HAYATA Ic. Pl. Formos. II. p. 134, et IV. p. 96. *Stauropsis luchuensis* ROLFE in Kew Bull. 1907, p. 131.

**Erythrodus chinensis** (ROLFE). *Physurus chinensis* ROLFE; HAYATA Ic. Pl. Formos. IV. p. 99, fig. 52.

**Adenostylis arisanensis** HAYATA n.n. *Zexine arisanensis* HAYATA Ic. Pl. Formos. IV. p. 106, fig. 55.

---

## ERRATA.

- P. III., line 12 from bottom, after easily put in be.  
P. 12, line 15 from bottom, after sp. nov. put in (Tab. I.).  
P. 13, line 12 from bottom, after sp. nov. put in (Tab. II.).  
P. 14, line 10 from top, after HEMSLE. put in (Tab. III.).  
P. 20, line 7 from bottom, after W.R.P. put in an ending quotation mark.  
P. 48, line 10 from bottom, for *kusukusa* read *kusukusense*.  
P. 98, line 18 from top, for *Saccolabium* read *Cleisostoma*.  
P. 111, line 16 from bottom, for sundy read sunny.  
P. 190, line 16 from top, for long read longa.
-

## Contributions to the Flora of Formosa.

### II.

#### Ranunculaceæ.

##### *Aconitum* LINN.

**Aconitum Fukutomei** HAYATA sp. nov. Caulis non visus. Ramuli flexuosi subcomplanati læves tenuiter hirsuti (pilis patentibus). Folia radicalia ignota. Folia in ramulo tripartita breve petiolata vel 3-foliolata, foliolis subæqualibus, terminali in circumscriptione obovato-lanceolato  $3\frac{1}{2}$  cm. longo  $1\frac{1}{2}$  cm. lato apice acuminato basi cuneato ad petiolulum 2-3 mm. longum abeunti margine laciniato, (laciniis linearibus  $1-\frac{1}{2}$  cm. longis  $2\frac{1}{2}$ -2 mm. latis), foliolis basilaribus laciniatis, utraque pagine hirsuta, nervis venisque supra impressis subtus elevatis, petiolis communibus 8 mm. longis. Flores versus apicem ramulorum racemosim dispositi vel ad axillas foliorum superiorum solitarii subnantes, pedicellis  $2\frac{1}{2}$  cm. longis hirsutis sursum bracteis 2 alternis instructis, bracteis linearibus 5 mm. longis; flores violacei, a basi sepali antici usque ad apicem galeæ 3 cm. longi. Sepalum posticum galeæforme 22 mm. longum 1 cm. latum et profundum dorso rotundato-convexum intus extusque hirsutum apice breve cuspidatum, cuspidate triangulari obtusa reflexa, basi subcuneato-contractum; sepala lateralina late rotundato-flabelliformia 14 mm. longa totiusque lata apice late rotundata basi arcuato-cuneata latere superiore interiore arcuata, latere inferiore exteriore arcuata ad basin 2 mm. latam truncata, utraque pagine hirsuta erecta prope apicem margine exteriore recurva. cætera plana; sepala antica ovato-oblonga vel obovato-oblonga 13 mm. longa 5-6 mm. lata apice obtusa vel cuspidato-acuta ad summum semper obtusa basi subito brevique cuneato-contracta utraque hirsuta ad basin 1 mm. lata margine tenuiter interiore recurva. Petala superiora 2, λ-formia longe unguiculata apice cucullata sub galea recondita, unguibus linearibus 9 mm. longis 1 mm. latis intus profunde sulcatis hirsutis vel subbarbatis (pilis patentibus) basi ~-formiter recurvis subcomplanatis, cucullis ?-formibus 9 mm. longis 1-2 mm. latis apice recurvis deorsum longe

linearibus basi  $\pm$  dilatatis ad extremitatem brevissime 2-lobis vel retusis tenuiter barbatis; petala 3 inferiora minima angustissime linearia 3 mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi haud contracta subglabra vel tenuiter barbata enervia. Stamina  $\infty$  glabra, filamentis exteriore recurvis 5-6 mm. longis a medio usque ad basin alatis, partibus alatis 3 mm. longis cum alis 1 mm. latis apice sagittatis vel gradatim ad partem exalatum abeuntibus, antheris reniformibus 1 mm. latis minus 1 mm. longis utrinque emarginatis. Carpella distincta pauca circ. 3 fusiforme linearia  $\pm$  obliqua cum stylo  $4\frac{1}{2}$  mm. longa glabra.

HAB. Mt. Kiraishuzan, leg. K. FUKUTOMÉ, Oct. 1913.

As the specimen is rather imperfect, exact determination is not possible. It should be comparable to some extent to *A. sachalinense* F. SCHMIDT in the linearly parted or lacinate leaves and in the size and hairy form of the flowers; but the new species is widely different from the congener in having glabrous filaments and more opened dorsal sepals.

### Ternstroemiaceæ.

#### *Actinidia* LINDL.

***Actinidia callosa* LINDL. var. *formosana* FINET et GAGN. Fl. As. Or.**

II. (1907) p. 20.

*Actinidia Championi* HAYATA in Herb. Bot. Gard. Tôkyô (non BENTH).

HAB. Mt. Taiton, leg. G. NAKAHARA, Aug. 1905, (No. 262-A).

Determined by Mr. W. R. PRICE at Kew.

### Malvaceæ.

#### *Gossypium* LINN.

***Gossypium hirsutum* var. *religiosum* WATT.**

HAB. Shizangan, leg. T. MAKINO, Nov. 1896.

Determined by Mr. SPRAGUE at Kew, through Mr. W. R. PRICE.

### Simarubeæ.

#### *Ailanthus* DESF.

***Ailanthus glandulosa* DESF. var. *Tanakai* HAYATA n. v. Arbor?**

Folia (in specimine nostro singulo) 55 cm. longa 26 cm. lata in circumscripto

tionē oblonga 27-foliolata, foliolis suboppositis, jugis  $3\frac{1}{2}$ -4 cm. remotis, inferioribus majoribus obliquis ovato-oblongis 13 cm. longis  $5\frac{1}{2}$  cm. latis apice subito acuminatis, (acuminibus linearibus) basi obliquis latere interiore latioribus 3 cm. latis latere exteriorē 2 cm. latis, basi in latere interiore truncatis, ad angulum partis truncatę glandulis 1-2 instructis, basi in latere exteriorē acutis vel cuneato-acutis ad angulum partis acutę glandulis 1 instructis, chartaceis, utraque pagine glaberrimis supra ad costas impresso-sulcatis, costis versus sulcos distincte graciliter elevatis, venis lateralibus utroque latere costę 10-11, mediis a costā angulo  $50^\circ$  egressis supra tenuiter impressis vel planis, costis venisque subtus distincte sed graciliter elevatis, venulis minute reticulatis, subtus subglaucis vel pallidis, margine integris; glandulis utroque latere margine 1-2 complanato-globosis 1 mm. in diametro supra planis subtus prominente elevatis ad centrum depressis, petiolulis 2-2 $\frac{1}{2}$  cm. longis subteretibus basi subito dilatatis, petiolis 12 cm. longis subteretibus basi  $\pm$  dilatatis. Flores ignoti. Paniculę fructiferę cymosę 25 cm. longę 30 cm. latę, pedicellis ultimis gracilibus 2-1 cm. longis. Samera generaliter una in receptaculo singulo sed interdum 2 lineari-oblonga  $\pm$  obliqua apice obtusissima sursum  $\pm$  tortuosa basi oblique obtusa latere raphę acuta, latere opposito obtusissima vel rotundata, venoso-reticulata 1-sperma, semine ad centrum sito.

HAB. Tōyenchō: Shibutsuke, in montibus 3000 ped. alt., leg. I. TANAKA, Nov. 1913.

Very near the type; but differs from it in the quite glabrous leaves and in the samarę which in this new variety are broader and usually convexed at the margin on both sides at the base, while in the type they are convex on one side, but concave on the other.

## Rhamneæ.

### *Rhamnus* LINN.

***Rhamnus acuminatifolia*** HAYATA Ic. Pl. Formos. III. p. 62. Descriptio auctata: Flores subumbellati 9-10-florati, pedunculis semper solitariis axillaribus 1- $\frac{1}{2}$  cm. longis hirsutis apice cicatricibus pedicellorum 5-6 notatis, cicatricibus rotundatis cupulęformibus ad centrum depressis, pedicellis cum pedunculo articulatis ad apicem pedunculi radiatim dispositis 4 mm. longis

hirsutis apice ad cupulas calycium expansis. Cupula calycis late campanulata 1 mm. longa 2 mm. lata extus hirsuta intus glabra discis flavis obtecta. Lobi calycis valvati triangulares 2 mm. longi  $1\frac{1}{4}$  mm. lati apice triangulari-obtusi extus subglabri plani intus glabri sursum prominente deorsum tenuiter costati post anthesin a cupula decidui. Petala late obovata cum sepalis alterna valde concava minus 1 mm. longa  $\frac{2}{3}$  mm. lata apice 2-lobata basi unguiculata  $\frac{1}{10}$  mm. longa glabra. Stamina 5, cum petalis opposita minuta cum filamentis 1 mm. longa, filamentis  $\frac{1}{10}$  mm. longis, antheris ovatis  $\frac{4}{5}$  mm. longis apice connectivis mucroniforme productis. Ovarium late ovato-rotundatum 1 mm. longum, stylo validiusculo columniformi  $\frac{2}{3}$  mm. longo apice brevissime 3-lobato.

HAB. Ritōzan, ad 6500 ped. alt., leg. T. KAWAKAMI, Juli. 1913, (No. 9).

## Leguminosæ.

### *Acacia* WILLD.

**Acacia confusa** MERRILL var. **Inamurai** HAYATA n. v. Arbor circ. 10 m. alta, circ. 2 ped. in circumscriptione. Phyllodia latere compressa falcato-lineariter lanceolata 10-8 cm. longa 7-4 mm. lata apice acuminata prope apicem subito angulo recto falcata basi attenuata in stipitem latere compressum  $1\frac{1}{2}$  mm. longum abeuntia membranaceo-coriacea utraque pagine manifeste 3-nervia, nervis parallelis, inter nervos 1-vena, venis parallelis, inter venas et nervos venulis longitudinaliter reticulatis, nervis venis venulisque utroque latere elevatis, margine integerrima sub lente nervata. Flores ignoti. Legumina valde complanata  $\pm$  falcata circ. 10 cm. longa 7-8 mm. lata apice obtusa basi subito attenuata ad stipitem 5 mm. longum abeuntia valde complanata ad suturas utrasque costulata, costulis elevatis, facie  $\pm$  depressa, inter cava seminum vix vel haud constricta, cavis seminum  $\pm$  elevatis, valvis 2 chartaceis fusco-cinerascentibus. Semina ellipsoidea vel complanata apice rotundata basi obtusissima ad extremitatem breve obscureque apiculata  $6\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata  $1\frac{1}{2}$  mm. crassa, utraque facie annulariforme maculata, annulis singulis  $4\frac{1}{2}$  mm. longis 2 mm. latis ellipticis, facie fusco-fulvescentia.

HAB. Kōshūn: Kuraru, leg. T. INAMURA, Oct. 1913, (fr.)

Very near the type, differs only by its much narrower leaves, pods and seeds.



It grows on the very windy side of the shore mountains in the southern part of Formosa. According to Mr. T. INAMURA, there is no difference between the type and the variety in the saplings. I doubt if this be not a mere form of the type.

## Rosaceæ.

### *Rubus* LINN.

***Rubus glandulosopunctatus*** HAYATA sp. nov. Frutex ramosissima, ramis et ramulis flexuosis sublaevibus vel tenuissime striatis, cum foliolis calyceibus petiolisque tenuiter hirtellis glanduloso-punctatis, punctis flavis minutis, aculeatis, aculeis cuspidato-triangularibus latere complanatis 2 mm. longis  $1\frac{1}{2}$  mm. latis acutis leviter desuper recurvis. Folia 7-5-foliolata in circumscriptione lanceolato-ovata circ. 10 cm. longa 4-5 cm. lata, foliolis lateralibus oppositis subaequalibus vel superioribus  $\pm$  minoribus, mediis ovato-oblongis  $\pm$  obliquis 22 mm. longis 1 cm. latis apice acutis basi obtusissimis vel rotundatis chartaceis duplicato-dentatis, (dentibus primariis 4 mm. remotis, denticulis secundariis 1 mm. remotis triangulari-acutis), sessilibus, venis et venulis supra non visis costis venisque subtus prominentibus, venulis subtus minute reticulatis; foliolo terminali ovato-lanceolato  $4\frac{1}{2}$  cm. longo  $1\frac{1}{2}$  cm. lato apice acuminatissimo basi obtusissimo margine duplicato-dentato, (dentibus primariis  $\frac{1}{2}$  cm. remotis 4 mm. altis, dentibus secundariis minutis 1 mm. a se remotis triangulari-acutis), venis lateralibus supra tenuiter impressis utraque latere costæ circ. 10 rectis ad apicem dentium primariorum attingentibus angulo  $35^\circ$  a costa egressis rectis subtus prominentibus, petiolis communibus  $2\frac{1}{2}$  cm. longis remotissime aculeatis gracilibus, rhachibus cum petiolulo folioli terminalis gracilibus 3 cm. longis, jugis foliolorum a se  $1\frac{1}{2}$ -1 cm. remotis, stipulis linearibus 7 mm. longis 1 mm. latis acuminatis. Flores ad axillas foliorum superiorum solitarii vel breve racemosi, racemis 1-2-floratis, pedicellis (vel pedunculis) erectis rectis. Cupula calycis 7 mm. in diametro extus ad centrum depressa, lobis ovato-triangularibus cum cuspidibus 7-8 mm. longis apice cuspidatis (cuspidibus 2 mm. longis vel longioribus) basi haud constrictis 4 mm. latis extus dense hirsutis vel glanduloso-punctatis intus velutinis crassiusculis margine tenuioribus. Petala rotundata 8-9 mm. in

diametro apice rotundata obtusa vel leviter emarginata basi brevissime unguiculata, (unguibus  $1\frac{1}{2}$  mm. longis ad basin 1 mm. latis), margine integra subrepanda hirsuta facie extus dense villosa intus tenuiter hirsuta basi crassiuscula alba. Stamina  $\infty$  ad marginem cupulae calycis inserta pluri-seriata, filamentis  $3\frac{1}{2}$  mm. longis  $\frac{1}{4}$  mm. latis sursum constrictis, loculis antherae lineari-oblongis  $\frac{1}{2}$ – $\frac{2}{3}$  mm. longis. Ovarium semi-obovoideum 1 mm. longum  $\frac{1}{2}$  mm. latum apice rotundatum basi cuneatum latere valde complanatum apice dorso glandulosomurricatum facie glabrum, stylo ad latus apicis ovarii sito  $1\frac{1}{2}$  mm. longo filiformi apice  $\pm$  dilatato truncato. Receptaculum ellipsoideum cum stipitibus 4 mm. longum hirsutum basi pilosum. Syncarpium elliptico-globosum 7 mm. longum, stylis purpurascens, cupula reflexa.

HAB. Ritōzan, ad 6000 ped. alt., leg. T. KAWAKAMI, Aug. 1913.

Near *Rubus roseifolius* var. *Maximowiczii* FOCKE, but differs from it in having minute glandular dots all over the plant.

## Hamamelideæ.

### *Corylopsis* SIEB. et ZUCC.

**Corylopsis stenopetala** HAYATA sp. nov. Frutex? Rami recti teretes cinereo-rubescens lenticellis minutis elevatis notati deorsum glabri sursum hirsuti, prope summum dense villosi. Folia oblonga ovato-oblonga maxima 11 cm. longa  $4\frac{1}{2}$  cm. lata apice acuminatissima vel cuspidata, (cuspidibus triangulari-linearibus  $1\frac{1}{2}$  cm. longis 6 mm. latis, ad summum aristatis), deorsum a medio usque ad prope basin subcuneata ad basin truncata et leviter cordata, margine a basi cuspidis usque ad medium distincte et tenuissime aristato-dentata, (dentibus a se 7–8 mm. remotis latere superiore  $1\frac{1}{2}$  mm. longis latere inferiore 6–7 mm. longis ascendentibus brevissimis ad summum aristis  $1\frac{1}{2}$  mm. longis instructis), a medio ad basin subintegra sed remotissime aristata, (aristis a se 1–3 cm. remotis), chartacea, (supra costis venisque distincte impressis, subtus distincte prominenteque elevatis, venulis subtus transverse tenuissime reticulatis elevatis supra haud vel vix visis, venis primariis lateralibus utroque latere costae 9 rectis ad apicem dentium attingentibus a costa angulo  $35^\circ$  egressis), basi subtrinervia supra subglabra subtus ad costas et venas tenuiter longeque barbata, barbis adpressis, petiolis

1½ cm. longis gracilibus subteretibus dense hirsutis. Spicæ subovatæ 2½ cm. longæ 2 cm. latæ; pedunculis in parte inferiore 5-6 nodosis ad nodos bracteatis et articulatis 1 cm. longis dense villosis bracteis basilaribus sterilibus imbricatis alabastrum spicæ complete involventibus, inferioribus sterilibus minoribus, mediis sterilibus majoribus, superioribus (in pedunculo) sterilibus gradatim minoribus ad bracteam fertilem abeuntibus, bracteis mediis (in pedunculo) ovatis valde concavis 1½-2 cm. longis 1½ mm. latis apice acuto-obtusis, basi obtusis circ. 5-nerviis basin spicæ amplexantibus extus dense villosis intus tenuiter hirsutis. Pars florifera spicæ 2 cm. longa villosa densissime florata, bracteis (fertilibus) sub flore uno singulis late ovatis inferioribus 8 mm. longis totiusque latis apice triangularibus obtusis basi obtusis valde concavis florem semi-amplexantibus extus intusque dense villosis margine subintegris, bracteolis sub flore singulo duabus ovato-linearibus ± falcatis concavis 4 mm. longis 2 mm. latis apice basique obtusissimis extus dense intus tenuiter villosis. Calycis tubus late tubuloso-campanulatus 2 mm. longus 2½ mm. latus extus tenuiter subpilosus (pilis simplicibus vel fasciculatis) vel subglaber, ore brevissime 5-dentatus, dentibus latissime brevissime triangularibus vel obsoletis vel semirotundatis ½ mm. longis totiusque latis barbatis. Petala 5 ad orem calycis affixa cum dentibus calycis alterna spathulata 4½ cm. longa 1½ mm. lata sursum obovata deorsum linearia, parte obovata 1½ mm. longa minus lata, parte lineari 3 mm. longa ⅔-½ mm. lata, basi ½ mm. lata, utraque glaberrima. Stamina 5 erecta recta exserta cum petalis alterna ad orem calycis inserta, filamentis linearibus valde complanatis 1 mm. latis 7 mm. longis sursum gradatim angustioribus, antheris quadrangularibus 1 mm. longis minus latis subrectangularibus cum filamentis toto glabris. Glandulæ 5 clavato-complanatæ cum staminibus alternæ 1 mm. longæ ⅔ mm. latæ apice ± dilatatæ ad centrum impressæ. Ovarium fere inferius vel semi-inferius 2-loculare, loculis 1-ovulatis, ovulis ad summum placentæ pendulis anatropis raphis ventralibus. Styli 2 a basi distincti 6 mm. longi teretes basi dilatati ad ovarium abeuntes, sursum latere profunde sulcati prope summum muricato-tuberculati, sursum ± tortuosi.

HAB. Shinshikei, ad 3000 ped. alt., leg. TAYEMON ITÔ, Jan. 1913.

Near *Corylopsis Veitchiana* BEAN (Bot. Mag. t. 8349), but differs from it in

the very much larger bracts, much narrower petals and in many other points; and from all other known species, this differs by the very narrow spatulate petals and ovate spikes and nearly truncate calyx.

## Passifloreæ.

### *Modecca* LAM.

**Modecca formosana** HAYATA sp. nov. = *Alenia formosana* HAYATA.

Herba volubilis validiuscula. Caulis teres glaber cavus in exsiccato longitudinaliter rugulosus. Folia alterna petiolata palmatim 3-fida in circumscriptione pentagona maxima 11 cm. lata totiusque longa profunde 3-fida rarius 5-fida 3-nervia rarius 5-nervia, (nervis subrectis vel arenato-divaricatis ad apicem segmentorum attingentibus a se angulo 45° divaricatis a basi usque 5 mm. altum se connatis), basi late truncata, parte truncata 6 cm. lata ad extremitatem subito attenuata, parte attenuata 3 mm. longa totiusque lata basi utroque latere auriculiforme cordata, auriculis supra in exsiccato rugosissimis, subtus ad centrum glandulis rotundatis subplanis  $\frac{1}{2}$  mm. in diametro instructis; nervis segmentorum lateralium excentricis, in basi 4 mm. a margine interiore distantibus basi a margine exteriori 12 mm. distantibus; segmentis lateralibus  $\pm$  interiora falcato-divaricatis linearibus, segmento centrali subrecto lineari vel lanceolato vel lineari-lanceolato chartaceo 10 cm. longo 22 mm. lato apice acuminato basi vix vel haud angustiore margine integro utraque glabro, costis venis venulisque utraque pagine elevatis, venis lateralibus primariis manifestis 8 a costa angulo 70° egressis; sinibus inter segmenta obtusissimis, sub sinu subtus glandulis minimis unis sitis; glandulis flavescentibus punctiformibus, petiolis circ. 2 cm. longis vel brevioribus subteretibus vel subtetragonis supra et utroque latere tenuiter sulcatis basi vix vel haud dilatatis glabris, stipulis fere obsoletis vel minutis late cuspidato-triangularibus  $\frac{1}{2}$  mm. longis; cirrhis simplicibus axillaribus 10 cm. longis deorsum teretibus supra medium 2-3-bracteatis (bracteis minutis) sursum dorso complanatis. Racemi axillares 1-2-florati longo pedunculati, pedunculis 3-6 cm. longis glabris teretibus supra medium flores singulos vel geminos lateraliter gerentibus, supra partem floriferam elongatis ad cirrhos simplices complanatos abeuntibus, bracteis sub basi pedicelli floris singulis triangulari-acuminatis 2 mm. longis  $1\frac{1}{2}$  mm. latis margine remote vel

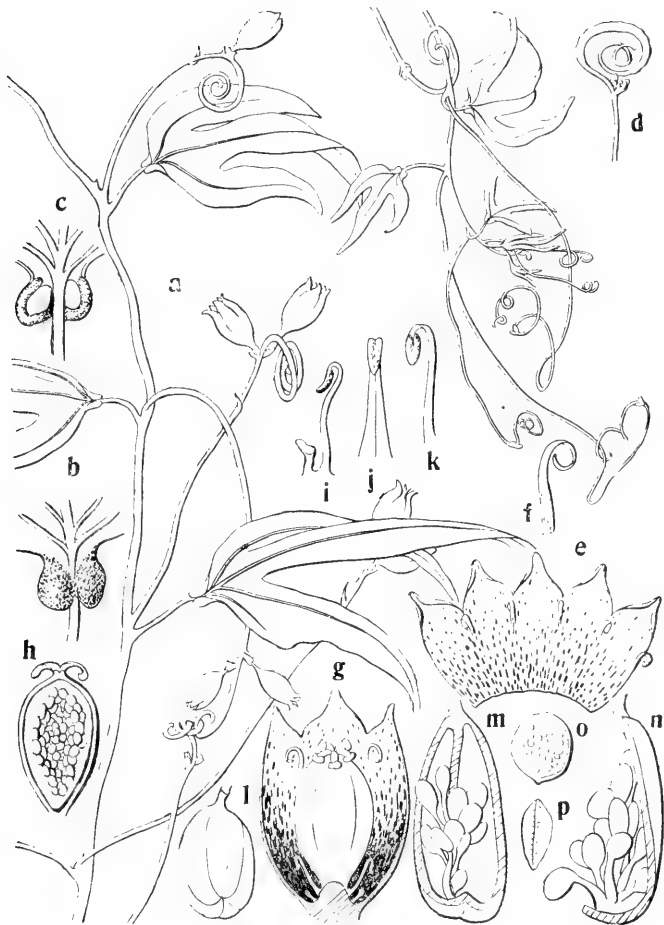


Fig. 1, *Moleeca formosana* HAYATA; a, the plant; b, basal portion of a leaf, showing glands, seen from above; c, the same, seen from below; d, a tendril; e, calyx of a female flower, expanded; f, a petal; g, an ovary; h, the same, in vertical section; i, a staminode with a glandule; j, another staminode; k, the same, seen from side; l, a fruit; m, a valve of the same; n, the same, seen from side; o, a seed; p, the same, seen from side; a, m and n  $\times \frac{1}{2}$ ; l, much reduced; others variously magnified.

obsolete denticulatis, bracteolis sub pedicello singulo duabus minutis triangulari-acutis  $\frac{1}{2}$  mm. longis, pedicellis infra medium articulatis 3-4 mm. longis teretibus glabris. Flores unisexuales. Fl. ♂: calyx fusiforme turbيناتus vel tubiformis utrinque contractus vel apice semiclausus crassus 10-12 mm. longus 6-7 mm.

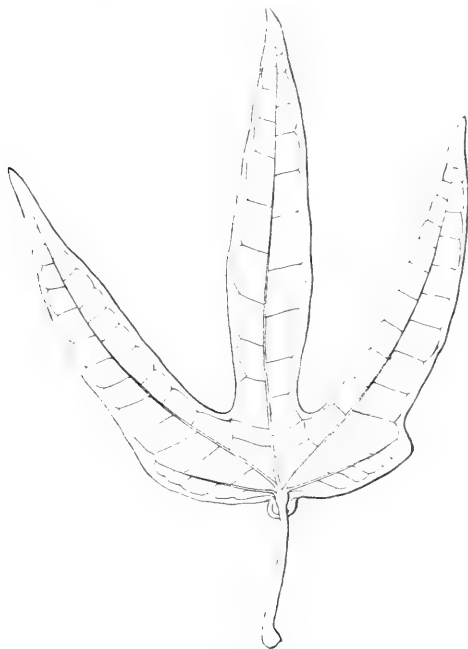


Fig. 2, *Modecca formosana* HAYATA; a leaf, seen from below; natural size.

latus facie 5-sulcatus inter sulcos impressim 1-striatus apice 5-lobatus (lobis triangularibus  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis dorso convexis intus planis) basi intus verticaliter lamellatus, lamellis ad columnam staminalem abeuntibus margine liberis cum petalis oppositis cum calycis lobis alternis. Petala 5 cum calycis lobis alterna linearia  $2\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice acuta vel obtusa basi erecta apice exteriore reflexa margine interiore recurva glabra. Glandulae vel squamae 5 inter lamellas basi

calycis tubi sitas dispositae cum staminibus oppositae lineares dorso complanatae planae  $1\frac{3}{4}$  mm. longae  $\frac{1}{8}$  mm. latae apice truncatae. Stamina 5 basi tubi calycis inserta 4 mm. longa, filamentis basi connatis  $2\frac{1}{2}$  mm. longis dorso complanatis basi triangulari-dilatatis basi  $\frac{2}{3}$  mm. latis, glabris, antheris basifixis

ovato-lanceolatis  $2\frac{1}{2}$  mm. longis minus 1 mm. latis apice acuminatis apiculatis basi latioribus cordatis. Rudimentum ovarii filamentis firme involuatum cylindricum 2 mm. longum  $\frac{1}{2}$  mm. latum plurisulcatum infra apicem  $\pm$  contractum. Fl.  $\varnothing$ : calyces petalæque ut floris masculini; glandulo breviores quam iis floris masculini. Staminodia triangulari-linearia  $2\frac{1}{2}$  mm. longa basi triangulari-dilatata 1 mm. lata apice obscure antheriformia. Ovarium stipitatum oblongo-ovoideum stylis stipitibusque exceptis 5 mm. longum  $3\frac{1}{2}$  mm. latum glabrum 4-5-carpellare 1-loculare 4-5-placentiferum, placentis parietalibus, stylo brevissimo  $\frac{1}{2}$  mm. longo 4-5-lobo, lobis patento-reflexis dorso complanatis  $\frac{1}{2}$  mm. longis totiusque latis apice stigmatē peltato rotundato ad centrum depresso terminatis, stipite  $1\frac{1}{2}$  mm. longo validissimo glabro tereti. Capsula pendula vel cernua stipitata longo pedunculata obovoidea 6 cm. longa  $4\frac{1}{2}$  cm. lata apice depressa in sectione verticali apice cordata basi obtusa rotundata extus nitida flava usque rubra 4-5-valvata, valvis coriaceis lineari-lanceolatis utrinque obtusis intus albescentibus. Semina  $\sigma$  rotundata valde compressa  $\pm$  angulata exocarpio membranaceo semi-hyalino oblecta, testa tenuiter coriaceo-crustacea extus remote grossequē impresso-punctata intus muricato-elevata, muricibus prominentibus obtusis trabeculiformibus, funiculis elongatis linearibus circ. 1 cm. longis complanatis 1 mm. latis, arillis campanulato-cupuliformibus 2 mm. longis 4 mm. in diametro basin seminum amplexantibus membranaceis margine irregulariter denticulatis.

HAB. Formosa.

I have lost a label given by a collector and my note mentioning affinities and localities of this species. They should be given in the next volume.

## Cornaceæ.

### *Cornus* LINN.

***Cornus longipetiolata* HAYATA sp. nov.** Arbor? Ramuli glabri sub-læves lenticellis minutis subalbis notati. Folia alterna approximativè sita longissime petiolata ovato-oblonga vel rhomboideo-oblonga 5-10 cm. longa  $3\frac{1}{2}$ -7 cm. lata apice breve acuminata vel cuspidato-acuta basi rotundata obtusa cuneato-acuta chartacea margine integra sed sub lente minute denticulata supra viridia haud nitida subtus glaucissima subalba, costis venis venulisque

tenuissime impressis subtus prominente distincteque elevatis, venis lateralibus primariis utroque latere costæ 5-7 angulo acuto vel obtuso a costa egressis, venulis transverse reticulatis, petiolis longissimis gracilibus 3-9 cm. longis laminam equantibus vel superantibus subtus dorso complanato-semiteretibus supra intus haud sulcatis planis basi vix dilatatis. Cymæ 8 cm. longæ 10 cm. latæ, floribus ignotis.

HAB. Tōyenchō: Shibutsuke, in montibus circ. 3000 ped. alt.; leg. I. TANAKA, Nov. 1913.

Near *Cornus controversa* HEMSL (= *Cornus macrophylla* MATSUM Ind. p. 446), but differs from it in having very much longer petioles and leaves with depressed veins and veinlets on the upper surface. I am a little too bold in treating this plant as a new with such an imperfect specimen. Still the very much longer petioles and impressed veins and veinlets on the upper surface of the leaves are so remarkable that it is quite sufficient to recognize the plant as distinct from other species.

## Caprifoliaceæ.

### *Viburnum* LINN.

***Viburnum arboricolum* HAYATA** sp. nov. Frutex 5 m. altus vel altior, in trunco arboris crescens vel terrestris. Rami cinerascens vel  $\pm$  fulvescentes lenticellis minutis notati longitudinaliter rugosi. Folia opposita oblonga lanceolata vel oblongo-lanceolata maxima 17 cm. longa 8 cm. lata apice breve cuspidata, cuspidibus 1 cm. longis 5 mm. latis ad summum obtusis, vel simpliciter obtusa coriacea glabra supra (in vivo) non nitida opaca viridia subtus pallidiora basi cuneato-acuta margine a medio sursum dentato-serrata, (serris ascendentibus a se 7 mm. remotis apice interiore recurvis latere superiore 2 mm. longis latere inferiore 13 mm. longis), deorsum usque ad basin integra, costis supra planis vel tenuiter elevatis subtus prominente elevatis, venis lateralibus primariis utroque latere costæ 7-8, mediis angulo 60° a costa egressis  $\pm$  arcuatis prope marginem evanescentibus, venis secundariis transversis transverse reticulatis, venis lateralibus supra tenuiter sed distincte impressis, subtus distincte elevatis, venulis supra non visis subtus distincte visis, petiolis 2 cm. longis. Cymæ terminales pyramidales in circumscriptione 15 cm. longæ



totiusque latæ, (pedunculis 5 cm. longis), verticillatim 2-superpositim ramosæ, ramis inferioribus rectangulare patentibus 7 cm. longis, ramis superioribus gradatim brevioribus, ramulis rectangulare patentibus stellato-pilosis, bracteis triangularibus lanceolatis 1 mm. longis stellato-pilosis apice obtusis. Flores campanulati 7 mm. longi 6 mm. lati. Calycis tubus basi cum pedicellis articulatus 2 mm. longus cylindricus 1 mm. latus glaber, limbo 1 mm. longo campanulato-patenti late 5-dentato, dentibus late triangularibus minus 1 mm. longis  $1\frac{1}{2}$  mm. latis apice acutis vel breve cuspidato-acutis. Corolla cylindrico-campanulata utraque glabra 5 mm. longa, tubo 3 mm. longo totiusque lato, lobis late cordato-rotundatis 2 mm. longis totiusque latis apice rotundatis basi cordatis, partibus cordatis imbricatis margine integris vel obscure crenulatis. Stamina 5 ad faucem corollæ tubi affixa. Stylus validus basi conicus apice clavatus 3-sulcatus. Drupa ellipsoidea 8 mm. longa  $4\frac{1}{2}$  mm. lata apice reliquis calycis lorum et styli coronata 1-sperma. Putamen semi-ellipsoideum, in sectione rotundatum 7-8 mm. longum 4 mm. latum, dorso acute 2-costatum latere acute angulatum facie profunde sulcatum vel excavatum.

HAB. Mt. Arisan: Funkiko, ad 6000 ped. alt.; in truncos arborum crescens, leg. B. HAYATA et S. SASAKI, Jan. 1912. fl.; Rinkiho, leg. T. DOR, 1912, fr.

Near *V. odoratissimum* KER., but easily distinguishable by the deeper green lusterless leaves.

**Viburnum melanophyllum** HAYATA, sp. nov. Rami oppositi purpureo-fusco-cinerascentes, cortice longitudinaliter rugoso. Folia ut videntur decidua late ovata 5 cm. longa 3 cm. lata apice breve acuminata basi rotundata in exsiccato nigricantia supra ad costam et venas stellato-tomentosa, subtus ad costas venas venulasque dense stellato-tomentosa membranacea margine serrulata, serrulis minutis 1 mm. longis totiusque latis apice aristato-acutis a se 1 mm. remotis, venis primariis lateralibus utroque latere costæ 9-10, mediis angulo  $40^\circ$  a costa egressis subrectis sursum ramosis, ramis rectis ad apicem serrularum attingentibus, supra tenuiter impressis, subtus costis venisque prominentibus, venis secundariis transversis minute transverse reticulatis elevatis, petiolis 15 cm longis. Cymæ terminales a basi ramosæ vel cæspitosæ dense tomentosæ, basi cataphyllis 3-4 lanceolatis crassiusculis 2 mm. latis 1 cm. longis

obtusis instructæ, 3 cm. longæ totiusque late ramosæ, bracteis lanceolatis dense stellato-tomentosis 5 mm. longis  $1\frac{1}{2}$  mm. latis. Fl. steriles marginales: corolla rotato-patens irregularis 5-lobata, lobis inæqualibus majoribus rotundatis 4 mm. in diametro. Fl. fertiles: calycis tubus suburceolatus vel truncato-obconicus subglaber 1 mm. longus  $\frac{3}{4}$  mm. latus, limbo 5-partito, partibus linearibus 1 mm. longis obtusis dense tomentosis. Corolla 5-lobata, lobis rotundato-oblongis. Stamina 5. Stylus ovoideo-coriaceus, stigmate 3-lobato.

HAB. Mt. Takasan, 6000 ped. alt., leg. N. KONISHI, 1909, mart.

Near *V. furcatum* BLUME.

**Viburnum propinquum** HEMSLE. Ind. Fl. Sin I. p. 355. Rami teretes oppositi fusco-rubescens lenticellis rotundatis notati. Folia opposita ovata ovato-oblonga 9 cm. longa  $4\frac{1}{2}$  cm. lata apice acuta vel triangulari-acuta basi late acuta vel obtuso-acuta coriacea vel coriaceo-chartacea utraque glabra margine remote serrulata, serrulis brevissimis ad mucronem reductis  $\frac{1}{2}$  mm. longis a se 9 mm. remotis, prope basin integra trinervia, nervis lateralibus a basi folii 5 mm. remotis arcuatis, nervis supra impressis subtus prominentibus, venis primariis lateralibus transversis venulis reticulatis supra impressis subtus tenuiter distinctis, petiolis  $1\frac{1}{2}$  cm. longis intus sulcatis glabris. Cymæ terminales 6 cm. longæ  $4\frac{1}{2}$  cm. latæ umbellatim ramosæ, pedunculis 2 cm. longis, bracteis ovatis minutis caducissimis, pulvinis sub bractea elevatis, ramis primariis (radiis umbellarum) 7, 2 cm. longis, ramis secundariis 5-6, 8 mm. longis, ramis tertianis (pedicellis) 3-4, 2-4 mm. longis breve hirsutis. Flores rotato-patentes 4 mm. in diametro 3 mm. longi. Calycis tubus 1 mm. longus, limbo campanulato-patenti circ. 1 mm. longo 5-lobato, lobis triangularibus apice obtusis  $\frac{1}{2}$  mm. longis 1 mm. latis. Corolla campanulato-rotata, tubo 1 mm. longo 5-lobato intus hirsuto et glanduloso-piloso, pilis clavatis glandulosis brevissimis, lobis oblongis  $1\frac{1}{2}$  mm. longis apice rotundatis basi haud contractis extus glabris intus prope basin hirsutis margine integris exteriore  $\pm$  recurvis. Stamina 5 ad basin tubi corollæ affixa, filamentis  $1\frac{1}{2}$  mm. longis linearibus apice filiformibus, antheris ellipticis dorsifixis. Ovarium inferius, stylo conico 3-sulcato.

HAB. Mt. Nantan, leg. U. MORI, 1910, Aprili. (fl.).

## Ericaceæ.

*Rhododendron* LINN.

**Rhododendron** (*Choniastrum*) **Tanakai** HAYATA sp. nov. Frutex 3 m. altus, in saxa  $\pm$  subscandens. Ramuli graciles teretes, cortice rubro-cinerascenti longitudinaliter fisso et soluto, cicatricibus cataphyllarum transverse linearibus 3 mm. latis  $\frac{1}{10}$  mm. longis remote notati, ad ramificationem cicatricibus semiotundatis foliorum verticillatim notati, usque ad ramificationem recti vel  $\pm$  recurvi sub-dichotome ramosi sursum 3 mm. in diametro. Folia ad summum ramulorum verticillatim sita coriacea supra atro-viridia impressae reticulata subtus pallida ovato-oblonga 10–15 cm. longa  $4\frac{1}{2}$ –5 cm. lata apice acuto-acuminata ad summum obtusiuscula basi rotundata ad extremitatem subito breveque attenuata ad petiolum abeuntia basi  $\pm$  obliqua vel interdum acuto-acuminata margine integra subplana  $\pm$  tenuiter desuper recurva utraque pagine haud nitida, costis venis venulisque supra impressis, costis subtus prominente elevatis validiusculis basi 2 mm. latis, venis lateralibus utroque latere costæ 10–12 gracillimis subtus tenuissime elevatis rectis angulo  $70^\circ$  a costâ egressis prope marginem reticulatim ramosis et evanescentibus, venulis tenuissimis tenuissime elevatis distincte visis, utraque pagine glabra, petiolis 2 cm. longis semi-teretibus supra planis medio tenuiter sulcatis subtus convexis apice  $\pm$  subalatis vel haud alatis basi vix dilatatis in exsiccato fusco-nigricantibus. Gemmæ florum ad apicem ramulorum circa gemmam foliorum verticillatim 3–4–5 sitæ, 1-floratæ elongato-oblongæ vel oblongo-fusiformes 4 cm. longæ 14 mm. latæ utraque extremitate obtusæ, perulis  $\infty$  scariosis, basilaribus extimis minutis triangulari-ovatis 4 mm. longis totiusque latis apice obtusis basi  $\pm$  contractis ad insertionem  $\hookleftarrow$ -formibus, inferioribus interioribus gradatim longioribus, interioribus superioribus longissimis obovato-spathulatis 3 cm. longis 13 mm. latis apice late triangularibus obtusis basi longe attenuatis margine integris interioræ recurvis sursum intus plus extus minus sericeo-pubescentibus deorsum glabris, perulis intimis spathulato-linearibus longissimis 33 mm. longis apice 5 mm. latis deorsum gradatim angustioribus ad basin 1 mm. latam reductis margine ciliatis extus glabris intus tenuiter pubescentibus apice rotundatis margine interioræ recurvis post anthesin caducissimis.

Flores apertientes campanulato-infundibuliformes 5 cm. longi albi vel leviter albo-purpurascens, pedicellis brevioribus glabris 5 mm. longis teretibus, viridibus. Calyx viridis 5-lobatus, lobis patentibus late triangulari-semi-rotundatis, ~-formiter recurvis, i. e. basi deorsum apice sursum recurvis,  $\frac{1}{3}$  mm. longis  $1\frac{1}{3}$  mm. latis apice late rotundatis margine pectinato-ciliolatis, ciliolis glandulosis, utraque facie glabris. Corolla campanulato-infundibuliformis 5 cm. longa 6 cm. lata, tubo 18 mm. longo basi 4 mm. lato apice usque ad 11 mm. latum dilatato, limbo 5-partito-lobato prope basin lobi superi maculato-punctato, maculis flavescentibus, lobis obovato-oblongis 33 mm. longis 25 mm. latis apice rotundatis vel ad centrum tenuiter retusis vel haud retusis margine crenulatis  $\pm$  undulatis multinervis longitudinaliter reticulato-venulosis, utraque pagine glabra sed prope basin corollæ tubi interiore tenuissime hirsuta. Stamina 10 in longitudine variabilissima, longissimum 4 cm. longum brevissimum 28 mm. longum, filamentis filiformibus complanatis usque 1 mm. latis sursum minus latis supra basin usque ad infra medium hirsutis cæterum glabris, antheris versatiliter dorsifixis obovato-rectangularibus 3 mm. longis 2 mm. latis apice truncatis breve 2-lobatis 2-porosis (poris  $\pm$  oblique terminalibus circ. 1 mm. in diametro) basi retusis, loculis apice truncatis basi obtusis tenuiter brevissime 2-lobulatis, connectivis apice haud productis basi brevissime productis ad summum extremitatem retusis. Ovarium viride cylindricum  $\pm$  declinatum 9 mm. longum basi 3 mm. latum apice 2 mm. latum apice truncatum basi haud contractum 5-lobatum 5-sulcatum, stylo declinato ~-formiter recurvo  $3\frac{1}{3}$ –4 cm. longo glabro circ. 1 mm. in diametro sectionis apice vix dilatatis infra stigma 3 mm. in diametro. Stigma viride 5-partitum in partem apicalem styli cupuliformem insitum, partibus cuneiformibus  $1\frac{1}{3}$  mm. longis apice truncatis. Disci annuliformes sub ovario siti margine remote denticulati, denticulis  $\frac{1}{3}$  mm. longis rectangularibus apice truncatis a se  $\frac{1}{3}$  mm. remotis, sinibus inter denticulos rotundatis. Capsula ignota.

HAB. Mt. Arisan: inter Karapin et Suisharyō, ad 3000 ped. alt., leg. B. HAYATA et I. TANAKA, 1913, Aprili. (fl.).

Near *R. ellipticum* MAXIM. and *R. leiopodium* HAYATA, but separable from them by the larger darker green leaves, nearly white flowers, very much shorter pedicels, and especially by the pectinately ciliate calyx-lobes. The

plant seems to be rather rare. We could find the tree only once in the Arisan ranges, during our journey through the mountains. It is a dwarf shrub nearly 2-3 m. high, sending the branches downwards along the rocks where it stands.

*Moneses* SALISB.

***Moneses rhombifolia*** A. ANDRES Piroleen-Studien, in Verh. Bot. Ver. Prov. Brand. LVI. (1914), pp. 23 et 69.

*Chimaphila rhombifolia* HAYATA Ic. Pl. FORMOS. II. (1912) p. 119, t. XVI.

Diapensiaceæ.

*Shortia* TORR. et GR.

***Shortia ritoensis*** HAYATA sp. nov. *Shortiopsis ritoensis* HAYATA in Sched. Herb. Mus. Taihoku. Rhizoma erectum validiusculum. Folia omnia radicalia coriacea longe petiolata, lamina ovato-oblonga vel oblonga  $\pm$  rectangulariformi 18 mm. longa 13 mm. lata apice obtusissima ad centrum mucronata basi fere truncata ad basin subito ad petiolum attenuata utraque glaberrima concolora margine partibus prope apicem basinque exceptis serrata, serris utroque latere margine 6-7 a se 2 mm. remotis transverse ascendentibus late triangularibus apice ascendentibus  $1\frac{1}{2}$ -2 mm. latis  $\frac{1}{2}$ -1 mm. longis obtusis ad summum mucronibus brevissimis coronatis, margine crasso-marginata basi apiceque subintegra, costis venisque supra tenuiter elevatis subtus costis prominente elevatis venis planis, venis lateralibus utroque latere costæ 4 subrectis apice obscuris ad apicem serrarum obscure attingentibus a costâ angulo 60°-70° egressis, venulis non distinctis sub luce transversa visis reticulatis, petiolis gracilibus cum laminis foliorum desuper arcuatis ad terram attingentibus 23-25 mm. longis subalatis supra profunde sulcatis subtus costatis basi  $\pm$  dilatatis. Scapi cum foliis æquilongi erecti terminales, basi bracteis basilaribus (vel cataphyllis) 3-4-verticillatis instructi, bracteis basilaribus lanceolatis 8 mm. longis 2 mm. latis concavis margine interiore recurvo-revolutis apice acuminatis multinervis, a supra basin usque ad prope apicem nudi, prope apicem sub flore 1-2-bracteis superioribus instructi, bracteis superioribus ovato-lanceolatis acuminatis 5 mm. longis valde concavis margine interiore revolutis. Flores ad apicem scapi solitarii; calycis lobi 5, 3-exteriore ovati

5½ mm. longi 3½ mm. lati apice acuti ad summum submucronati basi haud vel vix contracti, 2-interiores elliptici 5 mm. longi 2½ mm. lati apice rotundati vel obtusissimi ad summum retusi vel brevissime 2-lobati ad centrum sinus brevissime mucronati basi contracti rotundati 1 mm. lati margine prope apicem minute denticulati cæterum integri intus plani extus medio tenuiter costati (costis basi triangulari-dilatatis), multinerviis. Corolla (alba?) campanulata 7 mm. longa 5-lobata extus intusque glabra, tubo 1½ mm. longo, lobis cuneato-obovatis 6 mm. longis 4 mm. latis apice rotundatis basi late cuneatis sed vix angustatis apice 3-5-lobato-dentatis, dentibus triangularibus 1 mm. latis totiusque longis apice obtusis vel acutis interdum obtusissimis latere margine integris basi vix contractis pinnivenis, venis latelariibus utroque latere 2-3, venis ad apicem dentium attingentibus, sinibus inter lobos obtusissimis. Stamina 5 cum lobis corollæ alterna, filamentis validiusculis basi ad tubum corollæ usque ad sinus inter lobos corollæ adnatis, partibus liberis ¼ mm. longis ½ mm. latis valde complanatis ad basin utroque latere appendiculatis, appendiculis mucroniformibus 1/16 mm. longis, antheris cordatis 1½ mm. longis 1½ mm. latis apice emarginatis basi cordatim bilobatis intus  $\cap$ -formibus extus  $\cap$ -formibus dorsifixis, apicibus filamentorum vel connectivis dorso latoribus. Ovarium late globosum 1¼ mm. longum 1½ mm. latum apice plurimodepressum tenuiter 3-lobatum vel obscure vel haud lobatum glabrum, stylo columniformi tereti 2½ mm. longo apice truncato tenuiter 3-lobato. Capsula ovato-globosa 3 mm. longa loculicide dehiscens, valvis a placenta solutis, stylo non partito. Semina  $\infty$  rubra scobiformia ellipsoidea angulata ⅔ mm. longa, testa elegante reticulata. Staminodia nulla.

HAB. Mt. Ritōzan, by T. KAWAKAMI, Juli. 1913.

Resembles *Shortiopsis*<sup>22</sup> *exappendiculata* HAYATA (= *Shortia exappendiculata* HAYATA l.c. Pl. Formos. III. p. 147) in having nearly sessile anthers, not divided styles of the capsules and in the absence of the staminodes; but differs from it by the far much smaller leaves with different dentation, by the smaller flowers, very short broader complanate filaments with appendices on both sides and by the differently shaped anthers.

## Orobancheæ.

*Boschniakia* C. A. MEY.

**Boschniakia Kawakamii** HAYATA sp. nov. Parasitus ad radices *Rhododendronis* sp. Volva ignota. Caulis 13-35 cm. longus teres  $1\frac{1}{2}$ -2 cm. in diametro glaber basi squamis late triangularibus dense imbricatis obtectus, squamis sursum gradatim longioribus remotioribus in racemo ad bracteas abeuntibus, squamis superioribus infra partem floriferam caulis triangulari-lanceolatis 18 mm. longis 8 mm. latis coriaceis in exsiccato valde fragilibus concavis apice obtusis vel obtusissimis basi haud contractis  $\pm$  dilatatis decurrentibus utraque facie glabris a se  $1-1\frac{1}{2}$  cm. remotis. Racemi floriferi ignoti. Racemi (partes caulium fructiferorum) 8-16 cm. longi cylindrici cum fructibus  $3-3\frac{1}{2}$  cm. lati, bracteis elongato-obovatis oblongo-obovatis 2 cm. longis circ. 1 cm. latis apice triangulari-obtusis basi vix angustioribus  $\pm$  cuneato-angustatis vel haud angustioribus ad basin 6 mm. latis  $\pm$  decurrentibus, bracteolis nullis, pedicellis 3-2 mm. longis 2 mm. latis subcomplanatis apice gradatim dilatatis ad calycem abeuntibus glabris. Calyx fructifer: tubi subnulli vel brevissimi, limbo subpatenti cum receptaculo 8 mm. in diametro 4 mm. in radio margine integro vel irregulariter 3-5 lobato, lobo postico longiore late obovato-oblongo 3 mm. longo totiusque lato apice truncato-obtuso basi vix angustiore, lobis lateralibus sub-oblongis cum lobis anterioribus 2 connatis, margine in totum totis minute denticulatis minute remote brevissimeque glanduloso-ciliolatis. Capsula ovoidea  $\pm$  obliqua anteriore basi plus convexa posteriore minus convexa, inferior major 2 cm. longa 14 mm. lata apice triangulari-pyramidalis acuto-obtusa basi obtuso-rotundata sursum 3-gona 3-valvata, valvis ovato-triangularibus apice triangularibus ab apice usque ad medium solutis apice brevissime 2-fidis glabris. Semina complanata multi-angulariformia 1 mm. in diametro  $\frac{1}{3}$  mm. crassa radialiter reticulata, reticulis valde profundis alvum simulantibus.

HAB. Mt. Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et S. SASAKI, Oct. 1909.

Very near *Boschniakia himalaica* HK. f. et TH., but differs from it by the very short fruit-bearing pedicels attaining 2 mm. in length, (in Himalayan

species it is  $\frac{1}{2}$  in. long), and by the irregularly lobate and minutely glandularly ciliolate calyx-limb. Capsule in this species is always regularly 3-valved, while in Himalayan species it is irregularly 2-3 valved.

## Laurineæ.

### *Beilschmiedia* NEES.

***Beilschmiedia erithrophloia* HAYATA sp. nov.** Arbor, truncus erectus et rectus, cortice rubescenti variegato. Rami recti subternatim ramosi longitudinaliter rugulosi cicatricibus minutis elevatis notati. Folia tenuiter coriacea, in exsiccatu costis et venis subrubrescentibus, in vivo viridia supra nitida oblonga ovato-oblonga vel ovato-lanceolata 9 cm. longa  $4\frac{1}{2}$  cm. lata apice acuminata sed ad summum obtusissima vel simpliciter obtusa basi cuneato-acuta obtusa ad petiolum attenuata plus minus obliqua, costis rubescentibus supra subplanis vel tenuiter sulcatis subtus tenuiter elevatis, venis et venulisque utraque pagine distincte elevatis eleganter reticulatis, reticulis subtus plus distinctis, utraque pagine glaberrima margine integerrima sed  $\pm$  repando-undulata, venis primariis utroque latere costæ 5-6 arcuatis, petiolis  $1\frac{1}{2}$ -2 cm. longis semiteretibus  $\pm$  complanatis sursum intus planis deorsum sulcatis. Flores ignoti. Bacca obovoidea 2 cm. longa 12 mm. lata apice rotundata basi obtusa nigra nitida uni-sperma, pedicello haud incrassato.

HAB. Mt. Arisan, (3000 ped. usque ad 7000 ped. alt.), leg. R. KANEHIRA, I. TANAKA et B. HAYATA, Aprili., 1914.

One of the specimens of this species in my previous collections was brought to Kew by Mr. W. R. PRICE for comparison, and it was sent back to me with the following note. "Mr. GAMELE identifies this as a species of *Beilschmiedia* NEES., but can not match. The venation and shape of buds separate it from *Cinnamomum*.—W. R. P. The tree is very common in the Arisan ranges. I found the tree bearing fruit in January, 1912, and also in April, 1914; but I could never see the flowers.

### *Cinnamomum* BLUME.

***Cinnamomum pseudo-Loureirii* HAYATA sp. nov.** Fructus pisiformis ellipsoideus 1 cm. longus 6 mm. latus, tubo calycis auctato late campanulato 3 mm. longo  $4\frac{1}{2}$  mm. lato, pedicellis 6 mm. longis.



HAB. Tōyēn : Taiyakan, leg. I. TANAKA et S. NAKAI, Oct. 1912, fr.

Very near *Cinnamomum Loureirii* NEES., but differs from it by the quite entire calyx. Full description should be given in the next volume.

## Cupuliferæ.

### *Quercus* LENN.

***Quercus kodaihoensis* HAYATA sp. nov.** (Tab. IV.) (*Passia kodaihocensis* HAYATA) Arbor. Rami fusco-cinerascentes lenticellis minutis rotundatis parvo notati, ramulis et petiolis fusco-pubescentibus sulcato-angulatis. Folia oblonga obovata vel oblongo-ovata in magnitudine variabilissima, minora 8 cm. longa 3 cm. lata, maxima 14 cm. longa 6 cm. lata, apice cuspidato-acuminata basi cuneata vel obtusa margine sursum serrata, (serris ascendentibus a se 1-1½ cm. remotis latere superiore 2 mm. longis latere inferiore 1-1½ cm. longis), chartacea vel tenuiter coriacea supra (in exsiccato) viridia subtus plus minus pallida, costa supra impressa subtus elevata, venis primariis lateralibus supra impressis subtus elevatis utroque costæ latere 8-9 mediis angulo 50 a costa egressis subtus distincte elevatis, petiolis 1-3 cm. longis, intus tenuiter sulcatis basi valde tumidis. Cupula turbinata 1½ cm. longa 3 cm. in diametro basi rotundata ore leviter contracta 17 mm. in diametro, extus lepidibus triangularibus cuspidatis dense imbricatis adnatis oblecta, (lepidibus inferioribus longe triangularibus 1 mm. longis 4 mm. latis apice cuspidatis, superioribus late triangularibus apice cuspidatis multo minoribus), intus cicatricibus glandum perfecte occupata partibus ultra cicatricem 3 mm. altis. Glans semi-globosa 2 cm. longa 28 mm. in diametro basi cupula complete involucreta (cicatrice convexa rotundata), apice subtruncata leviter convexa vel subplana exposita tenuiter sericeo-villosa ad centrum mucronato-apiculata.

HAB. Kagi : Kodaiho, Sankyakunanzan, leg. S. NAKAI, Nov. 1912.

Near *Q. Konishii*, but differs from it by the much deeper cups, and by the truncated semi-globose glans. Also near *Quercus Cornei* in the shape of the cones, but differs in having far much smaller leaves.

***Quercus stenophylloides* HAYATA sp. nov.** Arbor. Rami cinerei longitudinaliter rugulosi, cicatricibus minutis remote notati. Folia coriacea ovato-oblonga vel ovato-lanceolata 9 cm. longa 3 cm. lata apice acuminata

rotundata obtusa vel acuta margine basi apiceque integra cæterum aristato-dentata, (dentibus 1 cm. a se remotis late brevissime triangularibus latere inferiore 1 cm. longis latere superiore  $1\frac{1}{2}$  mm. longis ascendentibus sursum  $\pm$  recurvis aristatis, aristis 1 mm. longis obtusis  $\pm$  superiore recurvis), supra nitida in exsiccato subrubescencia vel subviridescencia subtus glaucissima, costis venisque supra tenuiter sulcatis vel planis, subtus costis prominente elevatis venis tenuiter sed distincte elevatis gracillimis, venis primariis lateralibus utroque latere costæ 10–11 subrectis, mediis a costa angulo  $45^\circ$  egressis prope marginem subarcuatis ad apicem dentium attingentibus, venulis supra minute reticulatis subtus haud vel vix visis, petiolis  $1\frac{1}{2}$  cm. longis gracillimis semiteretibus intus subplanis vel late sulcatis. Cupula præmatura obconica 8 mm. longa 11 mm. lata ore vix vel haud contracta sessilis extus villosa, lepidibus (bracteis) connatis spiraliter 5-annulatis, annulis a se 2 mm. remotis margine denticulatis, denticulis truncatis dense villosis. Glans conico-globosa matura non visa.

HAB. Mt. Arisan, leg. K. UYEMATSU, 1912, Sept.

Near *Quercus stenophylla* MK.; but differs from it in having thicker leaves with different dentation.

## Coniferæ.

### *Cephalotaxus* Zucc.

***Cephalotaxus Wilsoniana*** HAYATA sp. nov. Arbor, ramulis rectis subglabris. Folia disticha spiraliter disposita linearia 4 cm. longa 3 mm. lata apice gradatim acuta basi obtuso-contracta supra in exsiccato costa distincte prominenteque elevata subtus minus distincte elevato-plana, margine tenuissime desuper recurva, subtus inter marginem et costam glaucissima. Drupa ellipsoidea vel obovato-ellipsoidea 18 mm. longa 10 mm. lata apice acuta breve apiculata basi obtusa subsessilis.

*Cephalotaxus* sp. HAYATA Fl. Mont. Formos. p. 215.

HAB. Mt. Arisan, leg. K. UYEMATSU, (No. 18) typus; Ganzan, leg. NAGASAWA, (No. 568).

Very near *Cephalotaxus drupacea* S. et Z., differing from it only by leaves with less acute (or nearly obtuse) apex and narrower base.

## Hydrocharideæ.

*Hydrocharis* LINN.*Hydrocharis asiatica* MIQ.

HAB. Kōshūn (Herb. Taihoku).

## Orchideæ.

*Oberonia* LINDL.

***Oberonia arisanensis* HAYATA** sp. nov. (Fig. 3, a-e, and h.) Epiphyta pendula. Caulis cum spicis 15 cm. longus cespitosus, partibus foliatis inferioribus 6 cm. longis dense approximativim foliatis, partibus floriferis pendulis filiformibus 7 cm. longis, partibus inter eam floriferam et eam foliatam 2-3 cm. longis squamiferis, squamis lanceolatis acuminatis 2 mm. longis. Folia alterna disticha approximata in exsiccato coriacea in vivo crassiuscula imbricata semi-oblonga equitantia latere compressa plana  $1\frac{1}{2}$ -2 cm.

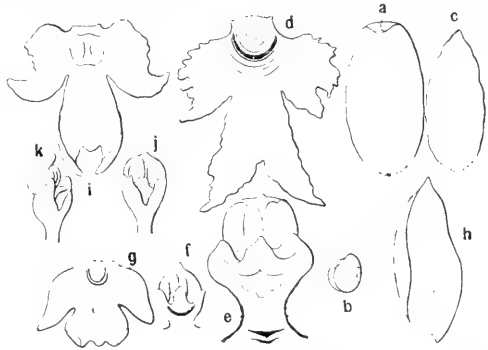


Fig. 3, a, b, c, d, e, h, *Oberonia arisanensis* HAYATA; a, a dorsal sepal; h, a lateral sepal; c, a petal; d, a lip; e, a column; b, a pollinium; f, g, *Oberonia formosana* HAYATA; g, a lip; f, a column, seen from front; i-k, *Oberonia kusukusensis* HAYATA; i, a lip; j, a column, seen from front; k, the same, seen from side.

longa 5 mm. lata apice obtusa vel ad summum apiculata basi ad vaginam abeuntia haud articulata, margine inferiore recta, margine superiore ~-formiter recurva, vaginis se imbricatis. Spicæ 7 cm. longæ, rhachibus filiformibus, floribus verticillatim aggregatimque ad nodos sitis, nodis a se 1-2 mm. remotis, bracteis ovato-lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis apice acuminatis margine obscure erosis, pedicellis cum ovariis 1 mm. longis. Sepalum posticum oblongum 1 mm. longum  $\frac{2}{3}$  mm. latum sursum concavum versus

apicem interiore recurvum breve cuspidatum, partibus cuspidatis interiore incurvis, margine integrum; sepala lateralia ovato-triangularia basi latissima 1 mm. longa  $\frac{3}{4}$  mm. lata apice acuta basi haud contracta concava. Petala oblonga 1 mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi haud contracta margine erosa. Labellum rubescens, ancoraeforme  $1\frac{1}{3}$  mm. longum totiusque latum alte trilobum, lobis basilaribus (lateralibus) oblongis  $\frac{1}{2}$  mm. longis apice obtusissimis basi vix contractis margine eroso-fimbriatis vel erosis, lobo terminali rectangulari 1 mm. longo  $\frac{1}{2}$  mm. lato apice 2-loba, lobis oblongo-triangularibus  $\frac{1}{2}$  mm. longis totiusque latis apice acutis, sinibus inter lobos truncatis interdum lobulo singulo brevissimo ad centrum instructis. Labellum basi  $\pm$  saccatum impressum. Columna brevissima

HAB. Arisan: inter Taroyen et Funkiko, circ. 6000 ped. alt., leg. B. HAYATA et T. ITÔ, Mart. 1914, (fl.).

Near *O. kusukusensis* HAYATA, but differs from it by the very short columns and much larger lips. Also near *O. formosana* HAYATA, but easily distinguishable by the larger leaves.

**Oberonia bilobatolabella** HAYATA sp. nov. (Fig. 4.) Epiphyta caespitosa pendula. Caulis cum racemis 15 cm. longus, partibus inferioribus foliosis 6-7 cm. longis, partibus floriferis 8 cm. longis filiformibus, partibus

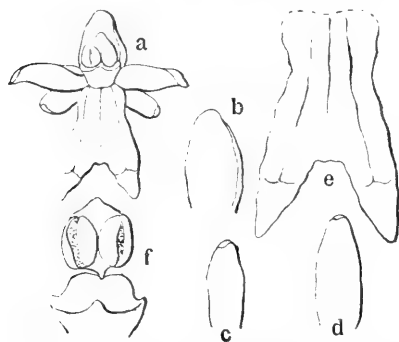


Fig. 4, *Oberonia bilobatolabella* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column, anther being a little lifted.

caulis inter foliatam et floriferam 2-3 cm. longis subnudis vel paucissime squamatis, squamis 1-2 lanceolatis 1 cm. longis subequitantes. Folia equitantes latere compressa complanata crassiuscula semi-oblongo-linearia circ. 3 cm. longa 3 mm. lata apice obtuso-acuta basi non contracta cum vaginis articulata margine superiore recta margine inferiore  $\cup$ -formiter recurva in exsiccatu coriacea, vaginis

tenuibus rhomboideis alternis imbricatis circ. 1 cm. longis. Racemi 5-8 cm. longi 8 mm. lati penduli, rhachibus pentagonis ☆-formibus filiformibus tenuibus, floribus ad nodos subverticillatim aggregatim sitis, nodis a se circ. 5 mm. remotis, bracteis singulis sub flore uno sitis ovato-triangularibus  $1\frac{2}{3}$  mm. longis circ. 1 mm. latis apice obtusis basi haud vel vix contractis margine irregulariter eroso-denticulatis, pedicellis cum ovariis 2 mm. longis. Flores circ. 3 mm. longi, sepalis petalisque retrorsum reflexis, labello antice patentem. Sepalum posticum rotundato-ovatum minus 1 mm. longum  $\frac{2}{3}$  mm. latum, apice obtusum basi contractum, lateralia ovato-triangularia valde concava 1 mm. longa  $\frac{3}{4}$  mm. lata apice obtusa basi haud contracta. Petala lineari-oblonga plus 1 mm. longa minus  $\frac{1}{2}$  mm. plus  $\frac{1}{3}$  mm. lata apice obtusissima basi vix contracta. Labellum in circumscriptione rectangulare plus 2 mm. longum plus 1 mm. latum planum basi  $\frac{1}{2}$  mm. latum 2-nervium basi utroque latere auriculis minutis  $\frac{1}{4}$  mm. latis semi-rotundatis instructum, supra medium 2-lobatum, lobis oblongo-triangularibus circ. 1 mm. longis plus  $\frac{1}{2}$  mm. latis apice acutis basi haud contractis, sinibus inter lobos truncatis  $\frac{1}{2}$  mm. latis. Columna brevissima  $\frac{1}{6}$  mm. longa  $\frac{1}{3}$  mm. lata.

HAB. Arisan, leg B. HAYATA et S. SASAKI, Jan. 1912.

Near *Oberonia arisanensis* HAYATA, but differs from it by the much larger flowers with nearly obsolete or, if at all, very much smaller lateral lobes of the lips and by the distinctly articulated leaves.

***Oberonia formosana*** HAYATA (Fig. 3, f, g), Mater. Fl. Formos. p. 309. Epiphyta caespitosa, caulibus simplicibus vel rarius pauciramosis 3-5 cm. longis toto longitudine foliatis. Folia disticha sessilia alterna approximata equitancia verticaliter compressa lineari-lanceolata 22 mm. longa  $2\frac{1}{2}$  mm. lata apice aristato-acuta margine integra basi latere inferiore recta superiore ∪-formiter curva vaginosa caulem amplexantia crassiuscula. Spicae terminales cum pedunculis 8 cm. longae cernuae, floribus minutis 1 mm. in diametro, secus rachin interrupte fasciculatim dense sitis, bracteis ovato-acuminatis 1 mm. longis reflexo-patentibus. Sepala lateralia late ovata basi connata  $\frac{1}{2}$  mm. longa totiusque lata obtuso-acuta patentissima, posticum minus. Petala sepalis angustiora oblonga  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata obtusa. Labellum sessile concavum rotundatum in circumscriptione  $\frac{2}{3}$  mm. longum totiusque

latum 3-lobatum, lobo medio majore apice tenuiter 3-lobulato obtuso, lobis lateralibus acutis brevioribus, basi minute callosum, callis rubris. Columna brevissima  $\frac{1}{3}$  mm. longa.

HAB. Nantô: Randaizan. leg. T. KAWAKAMI et U. MORI, Juni. 1907, (No. 3474).

Somewhat near *O. japonica* MAXIM., but differs from it in having long lanceolate leaves which are as three times long as those of the Japanese plant; still nearer *O. Clarkei* in its habit and leaves, but differs from it by the lips with acute entire side-lobes which in *O. Clarkei* are fimbriate.

**Oberonia kusukusensis** HAYATA sp. nov. (Fig. 3, i-k.) Epiphyta, caespitosa pendula. Caulis cum spicis 10-15 cm. longus, partibus inferioribus foliatis 3 cm. longis, partibus floriferis circ. 10 cm. longis pendulis filiformibus, partibus caulis inter floriferam et foliatam minute squamiferis circ. 2 cm. longis, toto glaber. Folia non articulata approximata disticha alterna basi se imbricata lineari-semilanceolata media 2-3 cm. longa 5 cm. lata apice acuta vel subobtusa breve apiculata basi caulem amplectantia in exsiccato membranacea in vivo crassiuscula equitantia a latere compressa complanata a caule angulo  $30^{\circ}$ - $50^{\circ}$  egressa margine inferiore recta margine superiore  $\curvearrowright$ -formiter recurva, vaginis cum lamina continuis. Spicae 10 cm. longae filiformes, floribus ad nodos subverticillatim aggregatimque sitis, bracteis singulis sub flore uno sitis, nodis a se 2 mm. remotis bracteis triangulari-lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis, pedicellis  $\frac{1}{2}$  mm. longis, ovariis  $\frac{1}{2}$  mm. longis. Flores apertientes  $1\frac{1}{2}$  mm. in diametro; sepalum posticum obovato-oblongum  $\frac{3}{4}$  mm. longum circ.  $\frac{1}{2}$  mm. latum apice obtusissimum basi  $\pm$  contractum margine obscure denticulatum vel integrum; sepala lateralialia valde concava triangulari-oblonga  $\frac{3}{4}$  mm. longa basi latissima non contracta  $\frac{3}{4}$  mm. lata apice obtusa ad summum breve apiculata. Petala ovato-oblonga  $\frac{3}{4}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusissime vel truncate obtusa basi  $\pm$  cuneato-contracta margine obscure eroso-denticulata. Labellum 3-lobum, circ. 1 mm. longum  $\frac{3}{4}$  mm. latum basi contractum, lobis basilaribus (lateralibus) oblique oblongis a lobo centrali angulo  $45^{\circ}$  divaricatis semiovatis apice cuspidato-acuminatis  $1\frac{1}{2}$  mm. longis margine interiore rectis subintegris margine exteriori inferiore obscure eroso-denticulatis basi rotundatis  $\curvearrowright$ -formiter recurvis, lobo centrali (terminali)

oblongo-rectangulari  $\frac{1}{3}$ – $\frac{2}{3}$  mm. longo  $\frac{1}{3}$ – $\frac{1}{2}$  mm. lato sursum latiore basi  $\pm$  contracto apice truncato-2-lobo, lobis triangularibus  $\frac{1}{3}$  mm. longis acutis, sinibus inter lobos lobulo singulo rotundato minuto instructis. Labellum basi obscure disciferum basi medio subsaccato-impressum. Columna brevissima  $\frac{1}{3}$  mm. longa basi valde constricta.

HAB. Kuskusu, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near *O. arisanensis* HAYATA; but differs from it by the very much smaller flowers with linear bracts which nearly surpass the flowers in length.

***Liparis* RICH.**

***Liparis dolichopoda* HAYATA sp. nov.** (Tab. V.) — *Cestichis dolichopoda* HAYATA. Rhizoma in arborem repens teres  $2\frac{1}{2}$  mm. in diametro vaginis obtectum vel subnudum. Caulis cum racemis 23 cm. longus teres basi bulboso-dilatatus basi 13 mm. in diametro basi vaginis obtectus vel subnudus, vaginis 5 cm. longis apice acutis partem bulbosum caulis amplectantibus. Folia basi racemi vel apice caulis 2–3–4 alternatim congesta, basi a caule articulatim soluta lanceolata 14 cm. longa 2 cm. lata apice obtusa basi plus minus angustata basi ad articulationem 7 mm. lata in exsiccatō membranacea, venis parallelis utraque pagine elevatis. Racemi circ. 10 cm. longi cylindracei 2 cm. lati, pedicellis (cum ovariis) 5 mm. longis horizontaliter patentibus, bracteis lanceolatis acuminatis erectis 3 mm. longis, floribus a se 3–4 mm. remotis. Flores albescentes vel albo-virides. Sepala subæqualia oblonga  $3\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi non contracta æquilata. Petala linearia  $3\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi æquilata  $\frac{1}{2}$  mm. lata. Labellum plus minus crassum obovatum 3 mm. longum 2 mm. latum valde recurvum medio subito angustatum apice bilobum, sursum prope apicem minute hirtellatum. Disci basi labelli breve 4– lamellati. Columna 2 mm. longa. *Liparis longipes* SCHLECHT. (non LINDL.) MATSUM. et HAYATA Enum. Pl. Formos. p. 404.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. B. HAYATA, Jan. 1912.

Near *L. longipes* LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. Vol. VIII. t. 37), but separable from it by the lips which are in this new species two-lobed at the apex. This species is that

orchid which was sent to R. SCHLECHTER some years before and was sent back here by him with the name of *Liparis longipes* LINDL.

**Liparis Kawakamii** HAYATA sp. nov. (Fig. 5.) Caulis (cum racemis) 23 cm. longus basi squamatus, squamis vaginiformibus 3-5 cm. longis 15 mm. latis apice acutis vel acuminatis, basi supra partem squamatam 2-foliatus. Folia oblanceolata sessilia 13 mm. longa 2 cm. lata apice acuto-obtusa basi attenuata, nervis manifestis 5, in vivo crassiuscula, in exsiccatō submembranacea. Racemi terminales 18 cm. longi, rhachibus complanatis alatis, alis 1 mm. latis, pedunculis 10 cm. longis squamiferis, squamis cum bractea

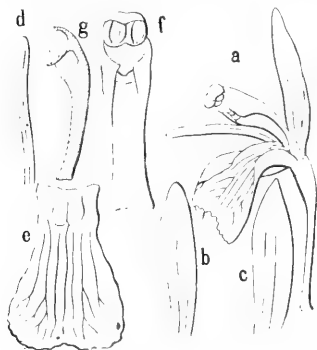


Fig. 5, *Liparis Kawakamii* HAYATA; a, a flower, one of the lateral sepals taken off; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column; g, the same, in vertical section.

conformibus lanceolatis 8 mm. longis 1-2 mm. latis acuminatis a se 1 cm. remotis, partibus floriferis 5-6 cm. longis laxiuscule floratis, pedicellis 7 mm. longis gracilibus, ovariis 2 mm. longis  $\frac{2}{3}$  mm. latis, bracteis-lanceolatis 8 mm. longis acuminatis. Sepalum posticum lineari-angustatum  $5\frac{1}{2}$  mm. longum  $1\frac{2}{3}$  mm. latum apice obtusum basi non contractum approximatin 3-nervium, lateralia  $\pm$  obliqua postico vix breviora. Petala angustissime linearia 6 mm. longa  $\frac{1}{2}$  mm. lata apice obtusa 1-nervia basi non contracta. Labellum cuneiforme 5 mm. longum apice  $3\frac{1}{2}$  mm. latum apice latissi-

imum medio  $\pm$  contractum  $2\frac{2}{3}$  mm. latum basi contractum  $1\frac{1}{2}$  mm. latum apice truncatum denticulatum latere margine subintegrum latere infra medium sub erectum, basi medio discis colosis instructum. Columna recurva 4 mm. longa dorso complanata, utroque latere leviter alata, alis prope apicem columnæ  $\pm$  dilatatis.

HAB. Formosa: Loco non indicato; leg. T. KAWAKAMI.

Near *L. Uchiyamæ* SCHLECHT., but differs from it by the broader leaves and less prominent auricles at the apex of the column.

**Liparis macrantha** ROLFE, (Fig. 6) in Ann. Bot. IX. p. 156; MATSUM. et HAYATA Enum. Pl. Formos. p. 406.



HAB. Kelung, Heichōshō, Mt. Arisan.

The orchid is rather widely distributed in the island. The type I have never seen. As far as the original description is concerned, our specimens may be referred to ROLFE's species.

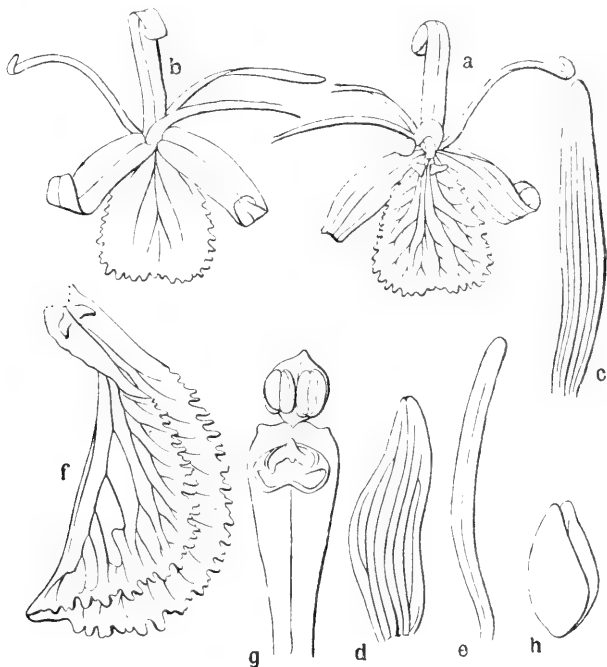


Fig. 6, *Liparis macrantha* ROLFE; a, a flower; b, the same, seen from back; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, a column, anther lifted; h, a pollinium.

***Liparis Nakaharai* HAYATA** (Fig. 7) Mater. Fl. Formos. p. 130. Caulis 2-foliatus inferne brevissime vaginatus, vaginis ovatis brevioribus superne gradatim elongatis. Folia 2 ad basin caulis sita oblanceolata cum petiolis 35 cm. longa 2 cm. lata racemum in longitudine æquantia apice

acuminata basi gradatim attenuata in petiolum 10 cm. longum abeuntia in basi articulata multinervia utrinque glabra. Flores mediocres 2 cm. in diametro, in racemum laxe-floratum 15 cm. longum terminalem pedunculatum dispositi, pedunculis 18 cm. longis gracilibus erectis, bracteis lanceolatis 1 cm. longis. Sepala libera patentia linearia 9 mm. longa 1 mm. lata apice obtusa, posticum postice reflexum recurvatum, lateralia antice paralleliter patentia inferne recurvata. Petala linearia 9 mm. longa  $\frac{1}{2}$  mm. lata postice et inferne reflexa. Labellum cuneiforme in circumscriptione 8 mm. longum,  $5\frac{1}{2}$  mm. latum a medio antice curvatum apice latissime truncatum irregulariter denticulatum basi columnæ affixum, a medio basi erectum inna columnam

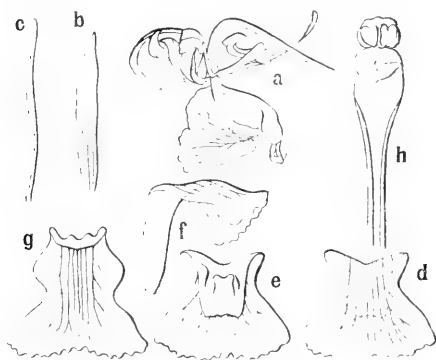


Fig. 7, *Liparis Nakaharai* HAYATA; a, a flower; b, a sepal; c, a petal; d, a lip; e, the same seen from back; f, the same, seen from side; g, the same seen from back; h, a column, anther lifted.

amplectans a medio superne patens clobatum basi 2-tuberculatum. Columna elongata 5 mm. longa semiteres.

HAB. Taitō, Manchōsha, leg. T. TAWAKAMI et G. NAKAHARA, Jan. 1906, (No. 766).

This is very distinct species; it is somewhat near *L. flaccida* in its habit, but very much different from it in having much larger lips, longer

pedicels and in many other points.

***Liparis platybolba* HAYATA** (Fig. 8) sp. nov. Epiphyta. Rhizoma in arborem repens complanato-teres 2 mm. latum, radices a basi pseudobulbi gerentes. Pseudobulbi valde complanati oblongi vel ovato-oblongi vel elliptici 2½ cm. longi 2 cm. lati 7 mm. crassi glabri basi reliquis squamarum obtekti apice 2-foliati, foliis cum petiolis articulatis, petiolis subnullis in utroque latera pseudobulbi valde decurrentibus, partibus decurrentibus 25 mm. longis tenuibus sursum 4 mm. latis deorsum angustissimis ad nullum reductis. Folia ob-

lanceolata 14 cm. longa 28 mm. lata apice triangulari-acuta basi gradatim angustata 8 mm. lata ad petiolum subnullum abeuntia secus medium tenuiter plicata exsiccato membranacea vivo crassiuscula supra viridia ad costas tenuiter sulcata utroque latere costae 3-4 nervata, nervis et venis supra non visis, subtus pallidiora, costis elevatis, nervis tenuiter visis, margine integra circ. plana tenuissima. Scapi (racemi) ad apicem pseudobulbi terminales, 20-25 cm. longi complanati deorsum distincte alati cum alis 4 mm. lati a basi sursum usque ad  $3\frac{1}{2}$  cm. longum nudi, plus sursum usque ad partem floriferam squamati, squamis inferioribus longioribus laxiusculis lanceolatis  $2\frac{1}{2}$  cm. longis 4 mm. latis acuminatis remotiusculis, superioribus minoribus densiusculis ad bracteam abeuntibus. Pars florifera racemi 10-15 cm. longa tereto-angulata, bracteis lanceolatis acuminatis 6 mm. longis erectis, floribus densiusculis a se 3-7 mm. remotis, pedicellis 2 mm. longis, ovariis 3-4 mm. longis clavato-teretibus apice truncatis basi attenuatis, floribus subclausis 4 mm. longis. Sepalum posticum erectum lineari-oblongum 5 mm. longum 2 mm. latum apice obtusum basi haud contractum 2 mm. latum 1-nerviū dorso carinato-costatum secus costas subplicato-concavum, lateralia cum postico conformia. Petala angustissime linearia 5 mm. longa  $\frac{1}{2}$  mm. lata erecta 1-nerviā 1-costata basi non contracta vix vel haud dilatata apice obtusa haud reflexa. Labellum subpatens in explicato sub-rotundatum  $4\frac{1}{2}$  mm. longum  $3\frac{1}{2}$  mm. latum apice cuspidatum, partibus cuspidatis elongato-triangularibus  $1\frac{1}{2}$  mm. longis basi 1- $1\frac{1}{2}$  mm. latis apice obtusis

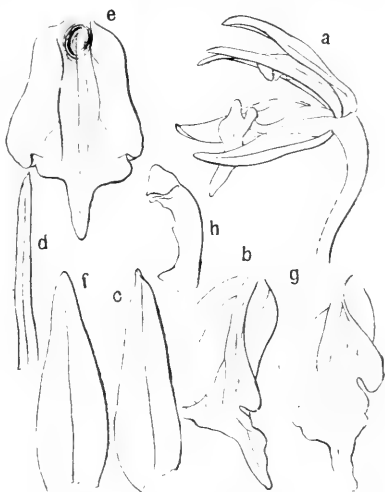


Fig. 8, *Liparis platybolba* HAYATA; a, a flower; f, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip seen from front; b, and g, the same, seen from side; h, a column, seen from side.

desuper leviter recurvis, a infra partem cuspidatam deorsum rotundatum, partibus rotundatis (i.e. hypochilis) 3 mm. longis totiusque latis vel latioribus distincte 5-nerviis suberectis basi medio valde concavis utroque latere suberectis, glabrum inter partem cuspidatam (epichilum) et partem rotundatam (hypochilum) valde ad marginem undulato-plicatum, margine deorsum prope basin integerrimum sursum sub eroso-denticulatum vel subintegrum. Columna 2 mm. longa fere semiteres apice clavata usque ad supra basin angustata basin leviter

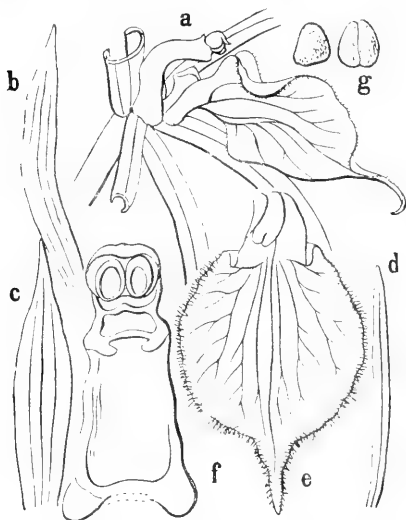


Fig. 9, *Liparis Sasakii* HAYATA; a, central portion of a flower; c, a dorsal sepal; b, a lateral sepal; d, a petal; e, a lip; f, a column; g, pollinia.

dilatata. Clinandrium valde concavum. Pollinia 4, paria in loculis segregata Capsulae racemosae subsecundae obovodeo-fusi-formes apice clavato-rotundatae basi fusiforme-attenuatae 3-costatae, inter costas 1-nervatae, in sectione subcirculares, pedicellis 3 mm. longis. *Cestichis platybolba* HAYATA in sched. Herb. Taihoku.

HAB. Arisan, inter Funkiko et Taroyen, leg. B. HAYATA et T. ITO Mart. 1914.

Remarkable for the very much laterally compressed pseudobulbs.

### ***Liparis Sasakii***

HAYATA sp. nov. (Fig. 9.)

Epiphyta in trunco *Chamaecyparis obtusa*. Caulis 8 cm. longus basi squamis multis obtectus, squamis ovato-rotundatis caulem amplectantibus 2 cm. longis totiusque latis vaginiformibus. Folia 2 fere sessilia obovata 5 cm. longa 2½ cm. lata apice obtusa vel rotundata deorsum angustata complete lateque caulem amplectantia. Scapi inter folia siti 7 cm. longi angulati,

partibus floriferis 2 cm. longis, bracteis cordato-cuspidiformibus 3 mm. longis basi latissimis 2 mm. latis apice subito angustatis cuspidatis ad summum obtusis, pedicellis 6 mm. longis, ovariis 2 mm. longis. Flores atro-purpurei. Sepalum posticum lineari-lanceolatum 13 mm. longum 3 mm. latum apice acuminatum basi cordatum auriculatum 3-nervium margine exteriori valde recurvum, lateralia postico æquiformia sed  $\pm$  obliqua. Petala linearia 12 mm. longa 1 mm. lata apice obtuso-acuta basi non contracta margine exteriori valde recurva. Labellum rotundato-obovatum 1 cm. longum 6 mm. latum apice rotundatum ad centrum breve cuspidatum, (cuspidibus  $1\frac{1}{2}$  mm. longis basi  $\frac{2}{3}$  mm. latis elongato-triangularibus), margine ciliolatum versus longitudinem subplicatum infra medium abrupte desuper reflexum basi contractum breve minuteque auriculatum ad basin appendicula una elevata instructum. Columna 3 mm. longa utroque latere alata, alis  $\frac{1}{2}$  mm. latis.

HAB. Mt. Arisan, leg. S. SASAKI, 1913, Mai.

Near *Liparis Henryi* ROLFE, but differs from it by the much smaller form, shortly caudate and ciliate lips and appendicules at the base of the lip.

**Liparis Somai** HAYATA sp. nov. (Tab. VI.) = *Cestichis Somai* HAYATA. Rhizoma . . . . Pseudobulbi ovoidei 4 cm. longi 2 cm. lati apice 2-foliati basi vaginis scariosis involucriati. Folia 2 oblanceolata vel spathulata 13 cm. longa 2 cm. lata apice obtusa basi attenuata plicata racemum amplectantia in exsiccato chartacea, venis parallelis utraque pagine elevatis. Racemi 15 cm. longi, pedunculis (partibus racemi non-floriferis) 5-6 cm. longis latere complanatis alatis cum alis 2 mm. latis, partibus floriferis dense floratis 10 cm. longis, pedicellis (exceptis ovariis) ascendentibus 3 mm. longis, bracteis lanceolatis 5 mm. longis 1 mm. latis apice acuminatis. Sepalum posticum lanceolatum 3 mm. longum 1 mm. latum apice obtusum basi non contractum, lateralia valde obliqua oblique ovata 3 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi vix contracta. Petala linearia  $2\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata apice acuminata basi non contracta. Labellum ovatum 3 mm. longum 2 mm. latum apice triangulari-acutum ad summum obtusum basi cordatum contractum ad medium plicato-recurvum. Columna tenuis  $1\frac{1}{2}$  mm. longa apice alata vel apice antice dentibus 2 instructa, dentibus obtusis minutis.

HAB. Kusukusu, leg. T. SŌMA, Jan. 1912.

Near *Liparis congesta*, but differs from it in having larger leaves and flowers.

**Liparis taiwaniana** HAYATA (Fig. 10, et Tab. VII.) Caulis brevissimus in pseudobulbum incrassatus 2-foliatus, vaginis brevioribus 5-6 instructus. Folia oblanceolata 18 cm. longa 17 mm. lata apice acuminata basi attenuata ima basi articulata 3-costata. Racemi ad apicem caulium laterales cum pedunculis 20 cm. longi folio æquilongi, partibus floriferis 8 cm. longis laxi-

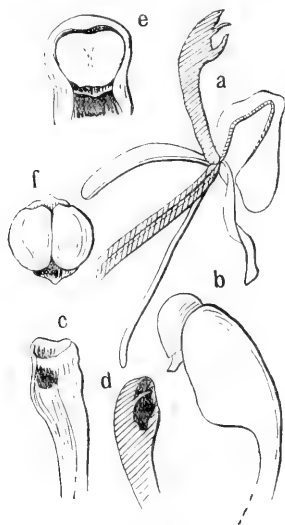


Fig. 10, *Liparis taiwaniana* HAYATA; a, a flower in vertical section; b, a column, seen from side; c, the same, seen from front, anther taken off; d, the same, in vertical section; e, apical portion of the column; f, an anther.

floratis, bracteis lanceolatis 7 mm. longis, floribus mediocribus 1 cm. in diametro. Sepala æqualia patentissima, exteriora valde reflexa recurva oblongo-linearia 1 cm. longa  $1\frac{3}{4}$  mm. lata apice obtusa. Petala angusto-linearia 1 cm. longa  $\frac{1}{2}$  mm. lata sursum margine convoluta teretia apice obtusa postice reflexa. Labellum ad basin columnæ, basi erectum a medio sursum patens, ima basi auriculatum, obovatum in circumscriptione 8 mm. longum apice dilatatum 7 mm. latum versus basin angustatum basi  $2\frac{1}{2}$  mm. latum margine latere integrum apice inæqualiter denticulatum lobis lateralibus obscuris, supra basin 2-tuberculatum. Columna 6 mm. longa semiteres 2-alata apice incurvata.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Jan. 1908, (No. 6309).

This is near *L. plicata* and *L.*

*Uchiyamæ*, but distinguishable from them

by the longer and more slender column of the flowers. The columns of the other species are very much shorter. Also very near *Liparis viridiflora* L., but differs from it in having larger flowers and in the lips with obscure lobes.

**Liparis Uchiyamæ** SCHLECHT. (Fig. 11) in lit. MATSUM. Ind. Pl. Jap.

II-1, p. 235.

Compared with  
a co-type of this  
species.

HAB. Rin-  
kiho, ad 4000  
ped. alt., leg. H.  
INABA, Juli. 1911.

This is per-  
haps the same  
species as *L.*  
*plicata* FR. et SAV.

**Oreorchis** LINDL.**Oreorchis****Fargesii** FINETvar. **subcapita** HAYATA

(Fig. 12) Ic. Pl.

Formos. II. p.

142. Terrestis,

pseudobulbis

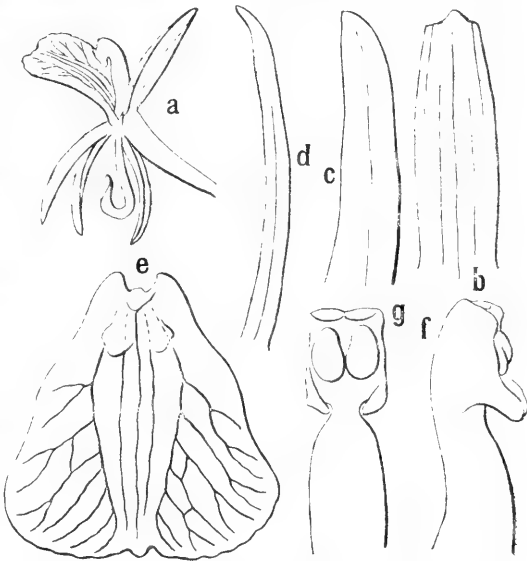


Fig. 11, *Liparis Uchiyamæ* SCHLECHT.; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column, seen from side; g, the same, seen from front.

3-4 nodosis ovoideis  $1\frac{1}{2}$  cm. longis 1 cm. latis apice rostratis basi rotundatis ad nodos squamis obtectis. Folia duo terminalia basi vaginis involucreta lineari-lanceolata, (excepte petiolum) 30 cm. longa 12 mm. lata apice acuminata basi attenuata ad petiolum 5 cm. longum abeuntia membranacea nervoso-plicata, cum petiolis articulata. Scapi e nodis juxta terminalem oriundi quam foliis breviores 20-25 cm. longi 3-4 nodosi ad nodos vaginati vaginis 4 cm. longis, laminis acutis, partibus floriferis brevibus 2 cm. longis floribus dense subcapitatum dispositis, pedicellis gracilibus (cum ovariis) 8 mm.-10 mm. longis, bracteis lanceolatis 4 mm. longis. Sepala sub-patentia subæqualia, posticum lanceolatum 11 mm. longum  $2\frac{3}{4}$  mm. latum apice obtusum basi plus minus angustum obscure 5-nerviuni, lateralia quam postico latiora oblique ovato-

lanceolata 9 mm. longa  $3\frac{1}{2}$  mm. lata distincte 5-nervia apice obtusa basi leviter contracta falcata. Petala oblique oblongo-lanceolata quam sepalis lateralibus angustiora 10 mm. longa 30 mm. lata apice obtusa distincte 5-nervia minute punctata. Labellum cuneato-obovatum basi unguiculatum, (cum unguibus  $1\frac{1}{2}$  mm. longis) 8 mm. longum 3 mm. latum ex apice unguis 3-lobatum, lobis lateralibus linearibus 2 mm. longis  $\frac{1}{3}$  mm. latis 1-nerviis apice obtusis, lobo medio oblongo-obovato 6 mm. longo 3 mm. lato margine denticulato-cristato,

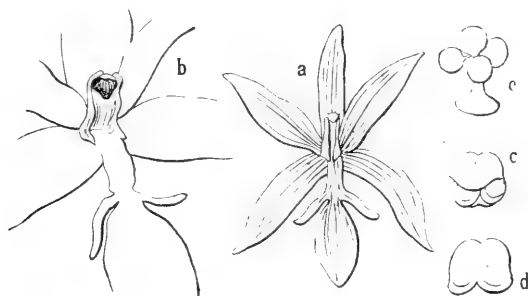


Fig. 12, *Oreorchis Fargesii* FINET var. *subcapitata* HAYATA; a, a flower; b, central portion of the same; c, an anther; d, the same, seen from back; e, pollinarium.

5-nervio facie parse punctato-cristato basi medio 1-lamellato-appendiculato, appendiculo plicato lineari 1 mm. longo. Columna brevis 2 mm. longa leviter alata basi auriculata in pedem brevissimum producta.

HAB. Mt. Rontabun, leg. U. MORI, Aprili., 1910.

Near *O. Fargesii* FINET, in Bull. Soc. Bot. Fr. (1896) XLIII. p. 697, Pl. XIII.; but differs from the type in having lips with oblong middle lobes, much shorter column and punctate petals.

#### *Dendrobium* Sw.

***Dendrobium erythroglossum* HAYATA sp. nov.** (Fig. 13, a) Caulis gracilis teres 30–40 cm. longus 1 mm. in diametro sectionis ramosissimus, internodiis 2–3 cm. longis cylindricis, ad nodos reliquis vaginarum fibrosis instructus hac atque illac tumido-dilatatus, partibus dilatatis fusiformibus 2 cm. longis  $2\frac{1}{2}$  mm. latis, sursum vaginis foliorum obteetus, vaginis cum internodiis



æquilongis cylindricis ore truncatis nervosis. Folia ad ramos superiores alternatim sita linearia 5 cm. longa 3 mm. lata apice obtusissima ad centrum breve mucronata, in exsiccato membranacea, basi subito contracta cum vaginis articulata. Racemi laterales 2-3 cm. longi pauci-florati sæpe 1-florati basi 1-2-vaginati, vaginis cylindræis 5 mm. longis, bracteis hyalinis ovatis pedicellum amplexantibus, pedicellis cum ovariis  $1\frac{1}{2}$  cm. longis. Flores rubescentes  $3\frac{1}{2}$  cm. in diametro. Sepalum posticum ovato-lanceolatum 33 mm. longum 8 mm. latum apice acuminatum basi leviter contractum margine deorsum exteriore recurvum  $\pm$  convexum 7-nerviū, lateralia lineari-lanceolata basi obliqua latere inferiore 33 mm. longa latere superiore 28 mm. longa apice acuminata basi latissima 8 mm. lata medio 5 mm. lata basi cum pede columnæ connata mentum 6 mm. longum formantia. Petala ovato-rhomboidea 33 mm. longa cum sepalo æquilonga 15 mm. lata apice triangulari-acuminata basi cuneata 5-nervia margine integra ad basin 3 mm. lata. Labellum cum sepalo petaloque æquilongum 33 mm. longum 18 mm. latum ovato-rhomboideum apice cuspidato-acutum basi cuneatum margine (exceptis partibus basilaribus) serrulato-denticulatum a medio usque ad basin crassiusculum cæterum tenue facie ubique breve hirsutum 3-lobum, lobis lateralibus (basilaribus) semiovatis suberectis brevibus, lobo terminali majusculo triangulari-ovato 17 mm. longo 16 mm. lato apice breve cuspidato-acuto basi vix vel haud contracto. Columna 2 mm. longa totiusque lata basi in pedem 6 mm. longum 3 mm. latum producta. Anthera oblonga 3 mm. longa breve hirsuta, filamentis filiformibus 2 mm. longis.

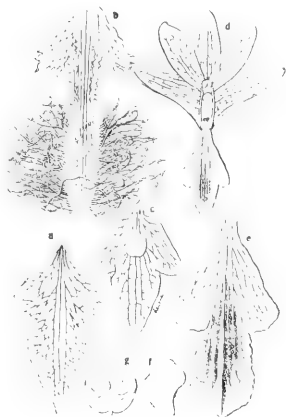


Fig. 13, a, a lip of *Dendrobium erythroglossum* HAYATA; b, a lip of *Dendrob. fimbriatolabellum* HAYATA; c, a lip of *Dendrobium heishanense* HAYATA; d-g, *Dendrobium kwasholense* HAYATA; d, a flower, lip taken down to show a gland at the base of the kin; e, a lip; f, an operculum; g, the same, lifted up; a, c, natural size, others more or less magnified.

HAB. Formosa: Loco non indicato; cult. in seminario Taihoku, leg. R. KANEHIRA, Juni. 1912.

**Dendrobium fimbriatolabellum** HAYATA sp. nov. (Fig. 13, b) = *Desmotrichum fimbriatolabellum* HAYATA in sched. herb. Taihoku. Caulis 40–60 cm. altus teres ramosissimus, internodiis  $1\frac{1}{2}$ –2 cm. longis subclavato-cylindricis 7 mm. in diametro, ad nodos subnudos vel subsquamatus nitidus in exsiccato flavescent subsulcatus, ramis basi angustatis sursum plus minus dilatatis sursum plus ramosis, internodiis terminalibus majoribus circ. 3 cm. longis clavatis apice dilatatis circ. 9 mm. in diametro sectionis. Gemmae ad apicem rami geminae vel fasciculatae divaricatae elongato-conicae 1 cm. longae. Folia ad apicem ramulorum sita cum nodis articulata oblonga oblongo-elliptica vel ovato-oblonga 10 cm. longa  $3\frac{1}{2}$  cm. lata apice rotundata ad centrum obscure leviter emarginata basi rotundato-contracta ad petiolum 4 mm. longum abeuntia supra nitida in exsiccato subcoriacea vivo coriacea crassiuscula, nervis principalibus circ. 11 utraque pagine elevatis, venis inter nervos circ. 3, margine desuper  $\pm$  recurva, petiolis plicatis 4 mm. longis 3 mm. latis cum nodis articulatis, vaginis nullis. Racemi breves  $1\frac{1}{2}$  cm. longi ad apicem ramulorum siti pauciflorati, bracteis multiseriatis scariosis ovato-lanceolatis 3–5 mm. longis acuminatis, pedicellis cum ovarii  $1\frac{1}{2}$  cm. longis gracilibus, floribus subalbescensibus  $1\frac{1}{2}$  cm. longis. Sepalum posticum lineari-lanceolatum  $1\frac{1}{2}$  cm. longum  $3\frac{1}{2}$  mm. latum apice acuminatum 5-nerviū basi non contractum plus minus concavum vel subplanum, lateralia lineari-lanceolata  $1\frac{1}{2}$  cm. longa 3 mm. lata apice acuta plus minus obliqua basi dilatata 5 mm. lata cum pede columnae affixa mentum 3 mm. longum formantia 5-nervia. Petala linearia  $1\frac{1}{2}$  cm. longa  $1\frac{1}{2}$  mm. lata apice acuta basi non contracta 3-nervia. Labellum lineare (exceptis partibus fimbriatis)  $1\frac{1}{2}$  cm. longum  $2\frac{1}{2}$  mm. latum apice acutum basi cuneatum 3-lobum, lobis lateralibus (basilaribus) oblongis angulo  $45^\circ$  lobo centrali divaricatis 4 mm. longis  $1\frac{1}{2}$  mm. latis margine fimbriatis, fimbriis 1 mm. longis linearibus, lobo centrali lineari 12 mm. longo 2 mm. lato basi apiceque  $\pm$  dilatato, parte dilatata superiore oblonga 7 mm. longa 3 mm. lata apice apiculato-acuta margine prope apicem integra ceterum valde fimbriata, fimbriis filiformibus  $1\frac{1}{2}$  cm. longis  $\frac{1}{16}$  mm. latis 1-nerviis angulo recto a lobo centrali divaricatis, medio subintegro-

vel crenulato, discis medio a basi usque ad partem dilatatam superiorem 2-lamellatis instructum, lamellis circ. 10 mm. longis 1 mm. latis margine undulato-crispatis, 5-nerviis basi integrum. Columna 3 mm. longa basi ad mentum 3 mm. longum producta.

HAB. KUSUKUSU, leg. B. HAYATA et S. SASAKI, 1912, Juli.

Flowers of this new orchid are somewhat near to those of *Desmotrichum spurium* J. J. SMITH, *D. angulatum* BLUME and *D. criniferum* KRÄNZL, (in Pfl.-reich. IV. 50, II. B. 21, p. 347, fig. 35 A-H.); but the branches are totally different.

***Dendrobium furcatopedicellatum* HAYATA** sp. nov. (Fig. 14). Caulis

teres rectus 40-30 cm. longus 2 mm. in diametro sursum foliatus a medio deorsum non foliatus vaginis foliorum obtectus. Folia linearia circ. 11 cm. longa 4 mm. lata apice acuminata basi æquilata vel leviter contracta 3-nervia membranacea in exsiccato tenuiter coriacea, vaginis tubiformibus  $3\frac{1}{2}$  cm. longis internodio vix longioribus caulem firme obtegentibus. Cymæ laterales 2-floratæ, pedunculis 13 mm. longis, basi

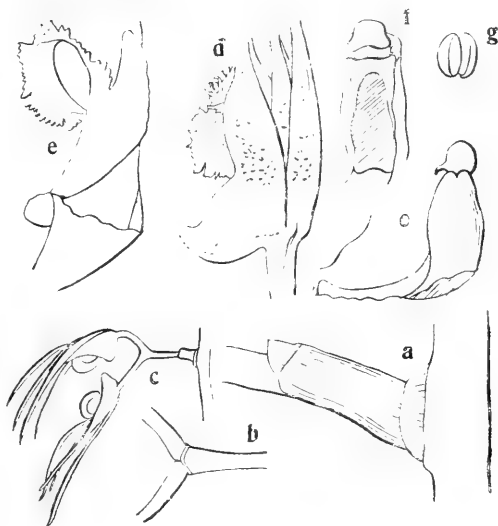


Fig. 14, *Dendrobium furcatopedicellatum* HAYATA; a, basal portion of a peduncle; b, basal portion of pedicels; c, inflorescence; d, basal portion of a flower, showing purple dots in the petals and sepals; e, the same, sepals and petals taken off, to show the labellum, articulation of the same and mentum; f, mentum and column; g, a column, stigma, rostellum, clinandrium and anther are seen; g, two pollinia, each of which is divided into two.

bracteis tubiformibus 1-2 instructis, pedicellis 10 mm. longis a se angulo 80° egressis. Flores sublaevi non patentes 30 mm. longi. Sepala erecta lanceolato-linearia flavescentia medio extus purpureo-maculato-punctata; posticum 30 mm. longum deorsum lanceolatum sursum lineare revolutum-filiforme, supra basin latissimum 3½ mm. latum, lateralia postico æquilonga leviter latiora basi obliqua cum pede columnæ connata mentum 5 mm. longum formantia, mento antice ± recurvo. Petala sepalo æquilonga angustiora. Labellum 3-lobum margine fimbriato-denticulatum, disco piloso.

HAB. Maisha, leg. B. HAYATA et S. SASAKI, Aug. 1912.

Near *D. biflorum* SWARTZ (PFTZER, in Pfl.-reich. IV. 50, II. B. 21. p. 168, fig. 11, A-D.); but differs from it in having lips with pilose discs.

**Dendrobium heishanense** HAYATA sp. nov. (Fig. 13, c). Epiphyta. Rhizoma ramosa tenue in truncos arboris repens, caulibus approximatis. Caulis 30-40 cm. longus teres sursum latissimus deorsum minus latus basi ± dilatatus medio 4-5 mm. latus basi supra partem dilatatam 2 mm. latus, partibus dilatatis conicis 5 mm. longis 6 mm. latis, radicibus sub parte dilatata dense sitis, internodiis mediis 3½ cm. longis, inferioribus clavatis subnudis, superioribus cylindricis vagina obtectis, vaginis cylindricis cum internodiis æquilongis ore truncatis. Folia lanceolata 6 cm. longa 8 mm. lata apice acuminata vel obtuso-attenuata basi contracta basi tortuosa in exsiccato tenuiter chartacea cum vaginis articulata. Racemi laterales ad nodos superiores siti brevissimi dense florati, bracteis basi imbricatis ovato-triangularibus valde concavis scariosis 3-5 mm. longis, pedicellis 18 mm. longis gracilibus, ovarii brevissimis 2 mm. longis 1½ mm. latis. Flores albo-rosei 2-2½ cm. in diametro. Sepalum posticum ovato-oblongum 18 mm. longum 6 mm. latum apice obtuso-acutum basi ± contractum 5-nerviū, lateralia oblique ovato-triangularia 2 cm. longa basi 1 cm. lata apice obtuso-acuta basi cum pede columnæ connata mentum 8 mm. longum ± ∪-formiter recurvum formantia 5-nervia. Petala oblonga 18 mm. longa 6 mm. lata apice obtusa basi cuneata manifeste 3-nervia vel obscure 5-nervia. Labellum late rhomboideum 17 mm. longum 13 mm. latum ad basin contractum ad apicem menti affixum 3-lobatum, lobis lateralibus (basinalibus) triangularibus 4-3 mm. longis erectis apice obtusis, lobo terminali triangulari-oblongo 10 mm. longo 7 mm. lato apice

triangulari-obtuso basi leviter vel vix contracto. Labellum medio infra lobum terminalem callo uno instructum, callo rotundato 2-3 mm. in diametro, lobis lateralibus facie brevis hirsutis, cæterum glabrum. Columna brevissima 1 mm. longa basi ad pedem valde concavum sacciformem latissimum 10 mm. longum (in explicato) 7 mm. latum producta.

HAB. Arisan: inter Heishana et Nimandaira, ad 7000 ped. alt., leg. B. HAYATA, Aprili., 1914.

This is near *Dendrobium candidum* WALL. in Ann. Roy. Bot. Gard. Calc. V. t. 19, in the broad concave mentum, in the size of the flowers and discs; but in other respects it is altogether different.

**Dendrobium kwashotense** HAYATA sp. nov. (Fig. 13, d-g, et fig. 15). Caulis secus rhizoma approximativè situs 40-50 cm. longus basi pseudobulboso-dilatatus, pseudobulbis globoso-conicis 2-3-nodosis 7 mm. latis totiusque longis subnudis, parte supra pseudobulbos angustata tereti, partibus angustatis 2-3 cm. longis 5 mm. latis teretibus 1-2-nodosis, parte supra partem angustatam fusiforme-dilatata, partibus fusiformibus 5-10 cm. longis 1½-2 cm. in diametro profunde 8-sulcatis 8-costatis 3-4-nodosis nudis, parte supra partem fusiformem complanata, partibus complanatis 10-25 cm. longis cum vaginis 7-9 mm. latis 6-8-nodosis, internodiis complanato-clavatis 2-3 cm. longis a vaginis perfecte obtectis, parte supra partem complanata tereti, partibus teretibus 10-15 cm. longis 3-4 mm. in diametro subnudis, internodiis 2½-3 cm. longis. Folia ovato-oblonga 6 cm. longa 23 mm. lata valde coriacea apice obtusissima ad summum brevissime inæqualiter 2-loba, lobo longiore ½ mm. longo apice obtuso, lobo breviori subnullo, basi subrotundata cum vaginis articulata, vaginis complanato-cylindræis 2 cm. longis 7 mm. latis ore truncatis, supra nitida, nervis venis paucis prominente elevatis, subtus venis multis minus prominente tenuissime elevatis, margine desuper recurva. Flores ad nodos superiores lateraliter subsolitarii vel paucè racemosi, pedicellis (cum ovariis) 2 cm. longis teretibus validiusculis 2 mm. in diametro, basi vagina singula instructis, vaginis cylindræis 6 mm. longis 2½ mm. in diametro scariosis nervosis apice 5-4-lobatis, lobis triangularibus 2 mm. longis acutis. Flores apertientes 5 cm. in diametro. Sepalum posticum lanceolatum 23 mm. longum 6 mm. latum apice obtusum basi non contractum,

margine sursum interiore recurvum 5-7-nervum, lateralia lanceolata triangularia latere inferiore 3 cm. longa latere superiore 2 cm. longa apice obtusa basi 13 mm. lata 7-nervia margine sursum interiore recurva. Petala lanceolata 12 mm. longa  $6\frac{1}{2}$  mm. lata, apice acuto-obtusa basi contracta obscure 7-nervia. Labellum obovato-oblongum 28 mm. longum 24 mm. latum apice breve acutum basi longe cuneatum multinervium tenuiter 3-lobum, lobis



Fig. 15, *Dendrobium kakashotense* HAYATA, photographed by Mr. T. SÖMA.

basiralibus (lateralibus) semi-oblongis a basi labelli usque ad apicem loborum lateralium  $1\frac{1}{2}$  cm. longis, ex apice loborum usque ad sinus intra lobos laterales et lobum terminalem 2 mm. longis apice truncatis, lobo terminali oblongo  $1\frac{1}{2}$  cm. longo circ. 1 cm. lato apice apiculato basi  $\pm$  contracto margine crenulato-denticulato.

Disci medio a

basi usque ad medium labelli 3-striatim siti, striis deorsum crassiuscule lamellatis sursum cristato-tuberculatis. Columna subnulla 4 mm. lata basi ad mentum 14 mm. longum 3 mm. latum planum crassum 3-nervium producta, mentis sursum prope apicem disco singulo instructis, disco flabelliformi substipitato 3 mm. lato 1 mm. longo flavo, stipite 3 mm. longo toto connato.

HAB. Kwashōtō, leg. T. SŌMA, Juni. 1913.

**Dendrobium leptocladum** HAYATA n. n. *Dendrobium tenuicaule* HAYATA (non HOOK. f.) Mater. Flor. Formos. p. 316.

As *D. tenuicaule* is given to an Indian orchid, another new name *D. leptocladum* should be given to this Formosan species.

**Dendrobium longicalcaratum** HAYATA sp. nov. (Tab. VIII). Epiphyta, in arbores crescens. Caulis foliiferus circ. 15 cm. longus, internodiis 1 cm. longis vaginis obtectis, vaginis quam internodiis longioribus scariosis obconico-cylindraceis hyalinis nervosis ore truncatis. Folia lanceolata 35 mm. longa 6-7 mm. lata apice acuminata basi contracta in exsiccato membranacea. Racemi ad apicem internodii laterales circ. 3 cm. longi 1-2-3-floriferi, bracteis triangularibus 6 mm. longis 5 mm. latis apice acutis 3-nerviis, rhachibus flexuosis purpureis, pedicellis 1 cm. longis, ovariis 3 mm. longis. Sepala extus leviter purpurea rubescentia 5-nervia, nervis purpureis, intus albiviridescencia. Petala alba. Sepalum posticum triangulari-oblongum 15 mm. longum 7 mm. latum apice acuto-obtusum margine ad apicem incurvum basi leviter contractum; lateralia valde obliqua, partibus supra insertionem ovarii lineari-oblongis vel oblongis 13 mm. longis 6 mm. latis apice acuto-obtusis, partibus infra insertionem ovarii 15 mm. longis quam iis supra insertionem longioribus 4 mm. latis cum pede columnæ connatis mentum 15 mm. longum 4 mm. latum cylindricum formantibus, mente apice obtuso. Petala oblique lanceolato-obovata apice obtusa basi angustata 14 mm. longa medio 5 mm. lata ad insertionem  $2\frac{1}{2}$  mm. lata 5-nervia. Labellum elongato-spathulatum basi cum mentum connatum, a basi sursum liberum longe unguiculatum cum unguibus 27 mm. longum 6 mm. latum, ungue 22 mm. longo lineari circ. 3 mm. lato basi cum mentum connato hac atque illac contracto margine ubique interiore plicato apice margine exteriori plicato constricto, parte supra constrictionem (lamina) ovata 9 mm. longa 5 mm. lata apice rotundato-obtusa. Discus apice et medio unguis situs 2-lamellatus. Columna supra insertionem brevissima 2 mm. longa, pede longissimo 18 mm. longo.

HAB. Urai, Aug. 1912, leg. B. HAYATA et S. SASAKI; fl. Nov. 1912 in horto botanico Tōkyō.

Very near *Dend. Victoria-reginae* LOHER and *D. subclausum* ROLIE (KRÄNZL. in Pfl.-reich. IV. 50, II. B, p. 11, fig. 6, A-G).

***Dendrobium moniliforme* Sw.** Compared with a specimen of the species in the Tōkyō herbarium.

HAB. Arisan, inter Taroyen et Funkiko, leg. B. HAYATA et T. ITO, Mart. 1914.

The form of the lips is subject to some mutability. It is ovate to rhomboidal, obtuse or acute at the apex, very much hirsute or nearly glabrous;

and the callosities at the base of the lips are in one specimen very prominent, but in another very faint.

***Dendrobium pendulicaule* HAYATA** sp. nov. (Fig. 16) = (*Aporom pendulicaule* HAYATA in Herb. Taihoku Museum). Epiphyta; caulis caespitosus, a summo ramorum arboris altissimae verticaliter pendulus 30-50 cm. longus lateraliter valde compressus, cum foliis 7 cm. latus viridissimus toto glaber. Folia disticha equitantia firme

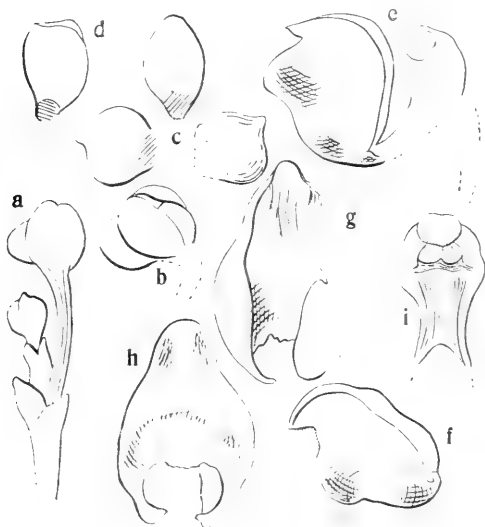


Fig. 16. *Dendrobium pendulicaule* HAYATA; a, inflorescence; b, a flower-bud; c, sepals; d, a petal; e, a flower, sepals and petals taken off, to show the lip, cross lines show yellowly tinted portions; f, a lip, seen from side; g, the same, seen from front; h, the same, seen from below; i, a column and foot; yellow maculations on the lip are crossed.

plicata (in exsiccato membranacea) plicato semi-oblonga (explicato oblonga) 5 cm. longa plicato 1½ cm. lata, explicato 26 mm. lata, explicato 10-nervia basi



cum vaginis articulata, vaginis imbricatis 3-4 cm. longis firmè caulem obtegentibus. Racemi pauciflorati laterales, bracteis minutis. Flores circ. 4 mm. longi albicantes. Sepala oblonga, lateralia quam postico latiora. Petala sepalo conformia. Labellum subsaccatum vel valde concavum apice valde sinuatum flavo-maculatum basi disco 3-striato hirsuto instructum. Capsula cylindrica circ. 10 cm. longa 8 mm. lata.

HAB. KUSUKUSU, leg. B. HAYATA et S. SASAKI, Juli., 1912.

Found hanging perpendicularly from a branch of a very tall tree, swinging to and fro even with a very gentle breeze.

***Bulbophyllum* THOU.**

***Bulbophyllum* (*Cirrhopetalum*) *flavisepalum* HAYATA (Fig. 17) Ic.**

Pl. Formos. II. p. 131.

Epiphyta, rhizomatibus repentibus radican-  
tibus teretibus 2 mm.  
in diametro sectionis,  
pseudobulbis ovoideis  
2 cm. longis 1 cm. latis  
apice obtusis truncatis 1-  
foliatis. Folia elongato-  
angustato-oblonga 7 cm.  
longa 17 mm. lata apice  
rotundata basi attenuata  
cum pseudobulbis  
articulata margine levi-  
ter recurva supra  
viridia subtus pallidiora  
crassiuscula supra  
plana, venis (in  
exsiccat) utroque latere



Fig. 17, *Bulbophyllum flavisepalum* HAYATA; a, a flower, seen from side; b, the same, a sepal, labellum, and mentum are seen, others are taken off; c, the same lateral sepals, labellum and mentum taken off, seen from face, clumna is seen; d, a labellum seen from face, elevated discus lines are seen; e, mentum and labellum, seen from below; f, columna, seen from face; g, the same, seen side; h, the same, seen from back; i, an anther; j, pollinia, two smaller, the others larger.

8-9, utraque pagine conspicuis. Scapi floriferi e latere pseudobulborum, aphylli 5-4 cm. longi, graciles vaginis tenuibus 3-4 instructi, vaginis inferioribus imbricatis, superioribus remotis ore obliquis acutis 6 mm. longis. Flores

5-10 flavescentes 1 cm. in longo diametro laxè umbellati rhachibus 2 mm. longis, pedicellis gracilibus 9-10 mm. longis basi 1-bracteatis, bracteis fusco-purpurascensibus 3 mm. longis. Sepala valde inæqualia, posticum liberum minus rubro-purpurascens ovato-quadrangulare  $3\frac{1}{2}$  mm. longum basi  $2\frac{1}{2}$  mm. latum 3-nerviū basi latissimum leviter contractum apice obtusum lateralia valde longiora linearia 13 mm. longa 3 mm. lata 3-nervia sed basi 5-nervia flava nervis rubescentibus, apice obtusa basi plus minus obliqua basi columnæ pede adnata mentum 2 mm. longum formantia supra basin introse tortuosa latere exteriori a se coherentia facie exteriori basi 3-lineari-maculata. Petala breviora quam sepalo postico oblonga 3 mm. longa  $1\frac{2}{3}$  mm. lata apice rotundata 3-nervia fusco-purpurascens leviter reflexa vel concava. Labellum brevius mentum in longitudine æquans basi erectum a medio sursum valde extrorse recurvum crassiusculum margine erectum apice obtusum acutum vel emarginatum medio discis linearibus 1 vel 2 instructum 2 mm. longum basi purpurascens. Columna brevissima  $1\frac{1}{2}$  mm. longa apice (clinandrium) latere bicornuta basi in pedem 2 mm. longum producta, (pede interiore recurvo lineari complanato) apice abrupte incurvis dilatatis. Anthera globosa,  $\frac{3}{4}$  mm. in diametro. Pollinia 4; 2 majora, 2 minora. Capsula prematura cylindrico-fusiformis 2 cm. longa 5 mm. lata apice obtusa basi attenuata triquetra facie leviter 1-costata. *Cirrhopetalum flavisepalum* HAYATA Herb. Taihoku.

HAB. Mt. Arisan, prope Taroyen, leg. B. HAYATA et S. SASAKI, Jan., 1912.

The orchid was found creeping on a large stone at a sunny place on the left side of the Arisan-road near Taroyen.

**Bulbophyllum gracillimum** HAYATA (Fig. 18) Ic. Pl. Formos. II p. 132. Epiphyta, caulibus gracillimis prostratis ad nodos radicanibus, teretibus  $\frac{3}{4}$  mm. in diametro sectionis, internodiis 1-2 cm. longis, ad nodos vaginatis, vaginis 3 mm. longis ore truncatis. Folia subsessilia crassa elliptica vel elongato-elliptica 22 mm. longa 9 mm. lata apice rotundata mucronata vel emarginata basi plus minus contracta ad petiolum 1-2 mm. longum abeuntia multinervia. Racemi axillares 1-2-florati 2 cm. longi graciles basi vaginati vaginis 1-2 mm. longis, basi pedicellorum 1-bracteati, bracteis ovatis acumi-

natis 3 mm. longis  $1\frac{1}{2}$  mm. latis, pedicellis cum ovario 2-3 mm. longis. Sepala inæqualia, posticum oblongo-angustatum 3 mm. longum  $1\frac{1}{2}$  mm. latum apice obtusum basi non contractum 3-nervium, lateralia basi pedecolumnæ adnata basi valde obliqua 3-nervia 3 mm. longa. Petala minutissima linearia  $1\frac{1}{2}$  mm. longa 1-nervia. Label-lum  $1\frac{1}{2}$  mm. longum  $\frac{1}{3}$  mm. latum basi erectum interiore recurvum medio sursum abrupte exteriore recurvum medio marginis valde transverse repando-plicatum. Discus 3-lamellatus. Columna brevissima latere antico breve cornuta, basi in pedem  $1\frac{1}{2}$  mm. longum producta, cum sepalis mentum formans.

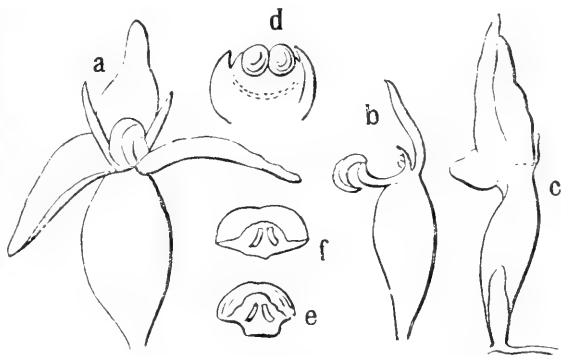


Fig. 18, *Bulbophyllum gracillimum* HAYATA; a, a flower; b, the same, seen from side, showing the columnal foot and lip; c, the same, seen from back; d, polinia on the clinandrium; e, and f, apertures.

tum interiore recurvum medio sursum abrupte exteriore recurvum medio marginis valde transverse repando-plicatum. Discus 3-lamellatus. Columna brevissima latere antico breve cornuta, basi in pedem  $1\frac{1}{2}$  mm. longum producta, cum sepalis mentum formans.

HAB. Nōkōzan, leg. T. KAWAKAMI et U. MORI, Jan., 1908.

**Bulbophyllum Inabai** HAYATA sp. nov. (Tab. IX.) *Cirrhopetalum Inabai* HAYATA. Rhizoma repens teres 1 mm. in diametro. Pseudobulbi ovoidei circ. 1 cm. longi 5-6 mm. lati. Folia oblanceolata vel elongato-oblonga 5 cm. long 8 mm. lata apice obtusa ad summum mucronata basi  $\pm$  attenuata in exsiccato tenuiter chartacea, supra venis lateralibus parallelis tenuiter elevatis, subtus pallidissima. Scapi  $2\frac{1}{2}$  cm. longi apice flores 5-10 umbellato-racemosim gerentes, bracteis basi pedicellorum sitis lanceolatis scariosis  $1\frac{1}{2}$  mm. longis, pedicellis 4 mm. longis. Sepalum posticum lanceolatum  $3\frac{1}{2}$  mm. longum  $1\frac{1}{2}$  mm. latum apice caudato-acuminatum basi non contractum, lateralia obliqua triangulari-lanceolata 5 mm. longa basi 2 mm. lata sursum attenuata margine convoluta, dua firme margine interiore se attingentia basi cum pede columnæ connata.

Petala obovata 2 mm. longa  $1\frac{1}{2}$  mm. lata apice rotundata vel leviter retusa basi leviter cuneata basi 1 mm. lata. Labellum lineare 2 mm. longum  $\frac{1}{2}$  mm. latum crassum deorsum utroque latere auriculiforme sursum teretiforme apice retusum. Columna 1 mm. longa apice antice 2-cornibus instructa, cornibus aristae-formibus rectis; pede 1 mm. longo angulo recto recurvo.

HAB. MAISHA, leg. H. INABA, 1911, Juli.

**Bulbophyllum kusukusense** HAYATA sp. nov. (Fig. 19) Epiphyta. Rhizoma in arbores repens teres  $2\frac{1}{2}$  mm. in diametro, reliquis vaginarum

fibrosis multis obtectum, infra partem insertionis folii radices filiformes subincrassatas abundante emittens. Pseudobulbi cylindrici 2-4 cm. longi 5-3 mm. in diametro (in exsiccato), apice folium unum gerentes. Folia crassa oblongo-linearita 10-15 cm. longa  $1\frac{1}{2}$ - $2\frac{1}{2}$  cm. lata apice obtusa ad summum retusa breve 2-lobata basi gradatim attenuata ad petiolum circ. 1 cm. longum abeuntia supra nitida viridissima subtus pallidissima supra ad costam subplicata, subtus costis acute elevatis, venis parallelis (in exsiccato) supra elevatis utroque latere costae 9-10, subtus non visis margine integerrima tenuissima. Scapi 1-florati, basi pseudobulbi oriundi 5 cm. longi gracillimi basi bracteis



Fig. 19, *Bulbophyllum kusukusense* HAYATA, a a flower; b, the same of the petals and petals taken off, showing the column, columnal foot, and the lip. c, a lip, shaded portions tinted red; d, a lip; e, f, and g, sections of the same; h, and the column, seen from front; i, the same seen from side; j, k, an anther seen from different sides.

A and b, natural size; others variously magnified; red portions on the lip are shaded.

4-5 scariosis vaginatis instructi. Flores subulbi circ. 2 cm. longi, sepalis petalisque purpureo-striatis. Sepala inaequalia, posticum ovato-oblongum 17 mm.

longum 5-6 mm. latum apice acutum basi 5 mm. latum 5-nervium 5-purpureo-striatum, lateralia oblique oblonga postico latiora basi cum pede columnæ connata. Petala sepalo minus lata lanceolata 17 mm. longa 4-5 mm. lata apice acuta 5-nervia purpureo-striata. Labellum crassissimum triangulari-lineare 9 mm. longum  $1\frac{1}{2}$  mm. latum subplicatum flavum ad marginem rubro-maculatum, maculis linearibus. Columna 3 mm. longa basi ad pedem 4 mm. longum lineare producta. Operculum cuspidato-cordatum 2 mm. longum dorso facieque toto glanduloso-cristatum.

HAB. Kusakusu, Juni. 1912, leg. B. HAYATA et S. SASAKI. Very near *Bulbophyllum affine* LINDL., but differs from it by the more elongate anthers and in other points.

**Bulbophyllum melanoglossum** HAYATA sp. nov. (Tab. X.)=*Cirrhopetalum melanoglossum* HAYATA. Radices filiformes crispatae subincrassatae sub pseudobulbo e rhizomate fasciculatim oriundae. Rhizoma in saxa arboresque repens teres  $1\frac{1}{2}$  mm. in diametro. Pseudobulbi ovati 1 cm. longi 6 mm. lati. Folia olongato-elliptica crassa  $3\frac{1}{2}$  cm. longa 7 mm. lata apice rotundata ad centrum retusa basi subito attenuata ad petiolum 2-3 mm. longum abeuntia supra nitida viridia subtus pallidissima, venis parallelis utraque pagine non visis. Scapi a basi pseudobulbi oriundi 9 cm. longi gracillimi basi 1-2 bracteis vaginiformibus instructi, ad apicem flores circ. 10 sub-umbellatim gerentes. Flores circ. 10 ad apicem scapi subumbellatim dispositi, pedicellis 6 mm. longis gracillimis basi bracteis lanceolatis 2 mm. longis instructis. Flores subpurpurei 12 mm. longi. Sepala inaequalia, posticum cum petalis firme imbricatum gleam formans intus valde concavum ovatum  $4\frac{1}{2}$  mm. longum  $2\frac{1}{2}$  mm. latum apice acuminatum margine longe ciliatum 5-striatum atro-purpureum, lateralia lanceolato-linearia  $1\frac{1}{2}$  cm. longa 2 mm. lata purpurea margine integra haud ciliolata  $\pm$  convoluta duae se firme margine interiore paralleliter attingentia. Petala oblique oblonga purpurea 3 mm. longa  $1\frac{1}{2}$  mm. lata apice obtuse acuta basi truncata non contracta  $1\frac{1}{2}$  mm. lata margine anteriore subrecta margine posteriore rotundata, margine tota longe ciliata, ciliis  $\frac{1}{2}$  mm. longis. Labellum cornuforme  $2\frac{1}{2}$  mm. longum utroque latere basi auriculis instructum crassum medio profunde sulcatum atropurpureum. Columna subrecta vel  $\pm$  recurva  $1\frac{1}{2}$  mm. longa antice leviter et tenuiter 2-alata, alis apice ad cornua

linearia 1 mm. longa productis, pede angulo recto recurvo circ. 3 mm. longo, parte inferiore cum petalis et sepalis connata, parte superiore libera sursum recurva, apice cum labello articulado.

HAB. Formosa; loco non indicato, cult. in seminario Taihoku.

**Bulbophyllum omerandrum** HAYATA sp. nov. = *Cirrhopetalum omerandrum* HAYATA. Rhizoma in arbores repens teres  $1\frac{1}{2}$  mm. in diametro vaginis scariosis obtectum. Pseudobulbi elongato-ovati 13 mm. longi 6 mm. lati apice  $\pm$  attenuati reliquis fibrosis vaginarum obtecti. Folia lineari-oblonga  $6\frac{1}{2}$  cm. longa 12 mm. lata apice obtusissima ad centrum retusa crassa in exsiccato coriacea, venis lateralibus parallelis utraque pagine leviter elevatis, basi subito in petiolum attenuata, petiolis 8 mm. longis intus profunde sulcatis. Scapi circ. 10 cm. longi basi vaginis scariosis instructi, vaginis 10–12 mm. longis ore obliquis, apice flores 2–3 racemosim gerentes, bracteis sub pedicello plicato-concavis 1 cm. longis, pedicellis 17 mm. longis. Flores subfulvescentes, petalis apice purpurascens, labello flavescens. Sepalum posticum ovatum 13 mm. longum  $6\frac{1}{2}$  mm. latum 5-nerviū apice obtusum ad summum cilio uno 2 mm. longo instructum basi non contractum 6 mm. latum margine sub lente minute crenulatum, lateralia oblique ovato-lanceolato-linearia 2 cm. longa 5 mm. lata apice obtusa basi plus minus contracta 5-nervia. Petala oblique oblonga 6 mm. longa 3 mm. lata apice obtusissima basi non contracta margine fimbriato-ciliata 3-nervia. Labellum liguliforme 7 mm. longum basi 2 mm. crassum. Columna brevissima 3 mm. longa antice subalata, alis apice ad cornua unguiformia productis, pede columnae 5 mm. longo superne recurvo. Anthera apice pectinato-ciliata.

HAB. Mt. Arisan: Heishana, 6000 ped. alt., leg. B. HAYATA et TAKEO ITÔ, 1914, Mai.

Remarkable for the pectinately ciliate anthers.

**Bulbophyllum uraiense** HAYATA sp. nov. (Tab. XI.) Rhizoma teres 4 mm. in diametro. Pseudobulbi ampulliformes  $2\frac{1}{2}$  cm. longi 8 mm. lati apice  $\pm$  attenuati ad summum truncati reliquis squamarum obtecti. Folia crassa oblonga vel oblongo-linearia 10 cm. longa  $4\frac{1}{2}$  cm. lata apice rotundata vel obtusa basi subito acuta attenuata ad petiolum  $2\frac{1}{2}$  cm. longum abeuntia in exsiccato coriacea, venis lateralibus parallelis utraque pagine

(in exsiccato) tenuiter elevatis, petiolis intus profunde sulcatis. Scapi folio longiores 16 cm. longi basi approximatin imbricatinque squamosi, sursum remotissime squamati vel haud squamati, apice flores 5–10 umbellatin gerentes, pedicellis 1 cm. longis basi bracteis 5 mm. longis lanceolatis scariosis instructis. Sepalum posticum ovato-lanceolatum 2 cm. longum 5 mm. latum valde concavum sursum lineari-acuminatum 5-nervium basi  $\pm$  contractum 2 mm. latum margine integrum; lateralialia lineari-lanceolata 5 cm. longa 3 mm. lata basi cum pede columnæ connata a medio sursum convoluta lineari-filiformia subteretia. Petala oblique recurvato-oblonga 6 mm. longa 3 mm. lata apice obtusa margine superiore convexa recurva margine inferiore concava recurva integra 3-nervia apice ad centrum mucronata. Labellum lineare valde recurvum 4 mm. longum 2 mm. crassum. Columna brevissima 1 mm. longa antice 2-alata, alis apice ad cornua linearia 2 mm. longa apice obtusa productis, pede apice libero cum labello articulado.

*Cirrhopetalum uraiense* HAYATA in sched. herb. Taihoku.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near *Cirrhopetalum boninense* MAKINO in Sômokuzusetsu XVIII. t. 20.

**Bulbophyllum viridiflorum** HAYATA (Fig. 20) Ic. Pl. Formos. II. p. 133. Epiphyta, pseudobulbis ovoideis 2 cm. longis 1 cm. latis 1-foliatis. Folia crassiuscula solitaria elongato-oblonga 3–5 cm. longa 10–12 mm. lata apice obtusa ad centrum acuta basi contracta ad petiolum 5 mm. longum abeuntia supra viridia ad costas impressa, subtus elevata pallidiora. Scapi sub pseudobulbo, aphylli 6 cm. longi descendentirecurvi basi 2–3-vaginati (vaginis imbricatis 7 mm. longis apice plus minus dilatatis ore obliquis) inferiore 1-vaginati, (vaginis dilatatis 12 mm. longis 8 mm. latis basi contractis apice dorso cuspidato-acutis,) uniflorati apice gradatim ad ovarium abeuntes. Flores solitarii apertientes 5 cm. in diametro pallido-viridescens. Sepala valde inæqualia, posticum oblongo-ovatum 28 mm. longum 14 mm. latum apice obtusum basi leviter contractum 5 mm. latum 7-nervium, lateralialia valde obliqua ovata 23 mm. longa 18 mm. lata apice obtusa basi leviter contracta cum pede columnæ connata mentum 1 cm. longum formantia 9-nervia. Petala cum sepalo postico conformia minora 23 mm. longa 11 mm. lata apice subacuta vel obtusa basi leviter contracta 5-nervia. Labellum basi erectum a medio recurvato-patens 15 mm. longum totiusque latum inferiore latere

membranaceum a medio sursum spongioso-crassum rugosum medio 1-sulcatum apice viridescens minute rubro-punctatum apice subacutum vel obtusum margine

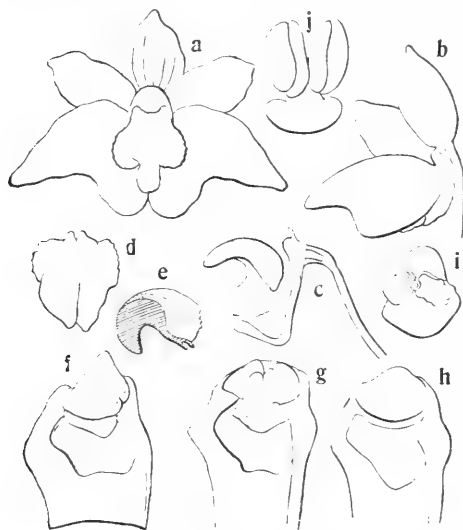


Fig. 20, *Bulbophyllum viridiflorum* HAYATA; a, a flower, seen from front; b, the same, seen from side; c, the same, sepals and petals taken off, column, mentum and labellum are seen; d, a labellum, seen from front, basal appendages are seen; e, the same, seen from side, medially cut, section-face shaded, minute red dots mentioned at the apex, basal appendages and claw are seen; f, column; g, the same, operculum taken off, 4 pollinia and translucent body seen; h, the same, anther taken off, clinandrium and stigma are seen; i, an operculum, seen from below; j, pollinarium.

inferiore eroso-denticulatum sursum integrum basi appendiculatum, appendiculis retrorsis brevissimis 2-lobatis, brevissime unguiculatum cum pede columnae articulatam. Columna brevissima vel nulla basi ad pedem producta, pede 2 cm. longo 4 mm. lato a basi usque ad medium cum sepalis connato, sed a medio sursum libero angulo 90° inflexo apice leviter concavo ad summum contracto cum ungue labelli articulatam. Pollinia 4 sessilia. Ovarium breve 6 mm. longum.

HAB. Mt. Arisan,  
leg. B. HAYATA et S.  
SASAKI Jan., 1912.

Flowered in May in a green house of the Koishikawa Garden, in February, 1912. It was brought back to the Garden by myself from Mt. Arisan. It was found on a large trunk of a *Quercus* at Nimandaira. Very distinct for the comparatively large flowers of greenish colour.

#### *Ione* LINDL.

*Ione Sasakii* HAYATA (Fig. 21) Ic. Pl. Formos. II. p. 139. Epiphyta,



rhizomate repenti tereti  $1\frac{1}{2}$  mm. in diametro sectionis, pseudobulbis remotis elongato-ovoideis 1 cm. longis 3–4 mm. latis apice attenuatis basi contractis 1-foliatis. Folia solitaria oblongo-linearia 5 cm. longa 7 mm. lata apice rotundata ad centrum emarginata vel breve 2-lobata basi attenuata cum bulbis articulata crassiuscula. Flores racemosi, racemis sub pseudobulbo sitis paucifloratis 3 cm. longis nodosis, interdodiis 5 mm. longis ad nodos 1-vaginat, vaginis inferioribus 1 cm. longis tubuliformibus, superioribus laminatis, laminis apice acuminatis, sub floribus singulis 1-bracteatis, bracteis ovatis 1 cm. longis 5 mm. latis apice acuminatis vel acutis basi leviter contractis, pedicellis (cum ovariis) 1 cm. longis. Flores patentes. Sepala subæqualia elongato-triangularia vel elongato-ovata, posticum 10 mm. longum  $4\frac{1}{2}$  mm. latum apice acutum vel acuminatum basi contractum 5-nervium, lateralia angustiora et longiora quam iis posticis 11 mm. longa 4 mm. lata apice acuminata basi cum pede columnæ connata

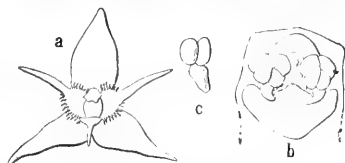


Fig. 21, *Ione Sasakii* HAYATA; a, a flower; b, a column; c, a pollinarium.

latere superiore basi angularia (angulis acutis), latere inferiore basi rotundata. Petala elongato-cuspidato-triangularia 7–8 mm. longa basi latissima 3 mm. lata non contracta apice lineari-cuspidata, (cuspidibus linearibus crassiusculis) margine inferiore denticulato-ciliata. Labellum cuspidato-rotundatum 5 mm. longum 3 mm. latum apice longe cuspidatum, (cuspidibus linearibus 4 mm. longis), basi abrupte contractum cum pede columnæ articulatam 3-nervium valde concavum basi ad medium 2-lamellato-appendiculatum. Columna fere nulla, basi in pedem  $2\frac{1}{2}$ –3 mm. longum producta, pede cum sepalis lateralibus mentum formanti.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *I. intermedia* KING et PANTLING, in Ann. Roy. Bot. Gard. Cal. VIII. t. 210; but differs by much acuminate or even caudate segments of the perianth. It was collected and sent to me by Mr. S. SASAKI with flowers preserved in alcohol, upon which the above description is based. It was also collected by myself, in January, this year, in the woods near Nimandaira in Mt. Arisan and was brought

back to the Koishikawa Garden where it flowered, in August, 1912, in open air. Sketches are drawn from living specimens.

*Eria* LINDL.

***Eria arisanensis*** HAYATA sp. nov. (Tab. XII.) Rhizoma in arbores repens. Pseudobulbi secus rhizoma approximativ siti elongato-ovati plus minus recurvi  $1\frac{1}{2}$ –2 cm. longi 5–7 mm. in diametro apice 2-foliati. Folia 2 ad apicem pseudobulbi sita oblongo-linearia 5 cm. longa 1 cm. lata apice obtusa basi angustata ad insertionem 4 mm. lata in exsiccat chartacea. Racemi ad apicem pseudobulbi siti 5 cm. longi 4–5 florati fusco-tomentosi, bracteis lanceolato-ovatis 8 mm. longis  $3\frac{1}{2}$  mm. latis apice acuminatis, pedicellis cum ovaris 8 mm. longis breve hirsutis. Sepalum posticum lanceolatum 10 mm. longum 3 mm. latum apice acuminatum basi plus minus contractum margine interiore recurvum 5-nerviū, lateralia obliqua falcato-oblongo-triangularia 10 cm. longa basi latissima 5 mm. lata cum pede columnæ mentum 5 mm. longum formantia falcato-recurva 5-nervia. Petala lanceolata 3-nervia 10 mm. longa 2 mm. lata apice acuta basi non contracta. Labellum obovato-spathulatum 11 mm. longum 6 mm. latum apice rotundatum vel leviter emarginatum basi attenuato-cuneatum apice 3-lobatum, lobis lateralibus oblongo-triangularibus 2 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusis, versus centrum falcatis, lobo centrali rotundato 3 mm. longo totiusque lato crassiusculo botryoideo-tuberculato. Discus a medio usque ad basin labelli situs 2–3-lamellatus. Columna 3 mm. longa basi ad pedem 5 mm. longum producta.

HAB. in monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912. Fl. in horto botanico Tōkyō.

Very near *Eria reptans* M.K. (*Eria japonica* MAX.); but distinguishable from it in many points.

***Eria hypomelana*** HAYATA sp. nov. (Fig. 22). Epiphyta. Pseudobulbi ovato-cylindrico-fusiformes 3 cm. longi 7 mm. lati squamis scariosis ovatis obteeti sursum approximativ 3–4-foliati. Folia oblanceolata vel lanceolata  $8\frac{1}{2}$  cm. longa 1 cm. lata coriacea viridia nitida apice acuminata basi longe attenuata ad extremitatem dilatata 5 mm. lata. Racemi ad axillas foliorum superiorum 6 cm. longi, pedunculis 2 cm. longis, floribus laxiuscule dispositis a se 1 cm. remotis, rhachibus tomentosis, bracteis tomentosis ovatis 1

cm. longis 5 mm. latis apice acutis margine minute denticulatis, pedicellis 8 mm. longis, ovariis 6 mm. longis tomentosis. Flores cinereo-viridi-flavi, purpureo-striati semiclausi non patentes. Sepalum posticum oblongum 11 mm. longum 4 mm. latum basi leviter contractum apice obtusissimum 5-nervium 5-purpureo-striatum; lateralia oblique oblongo-triangularia 11 mm. longa basi latissima 6 mm. lata apice obtusissima basi latissima basi pede columnæ connata 5-nervia purpureo-striata. Petala oblongo-lanceolata 9 mm. longa 3 mm. lata apice obtusa basi contracta 3-nervia purpureo-striata.

Labellum in circumscriptione obovatum 9 mm. longum in explicatio 6 mm. latum apice truncato-emarginatum basi cuneato - contractum 3-lobatum, lobis lateralibus semi-

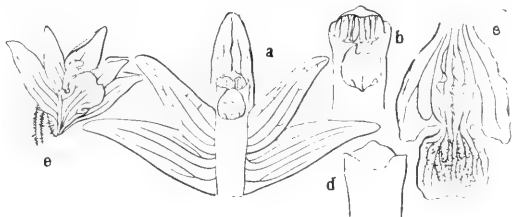


Fig. 22, *Eria hypomelana* HAYATA; e a, flower; a, a flower, explicated, lip taken off; c, a lip; b, upper portion of a column; d, the same, seen from back.

oblongis 5 mm. longis 2 mm. latis erectis columnam subamplectantibus, lobo terminali late subreniformi 3 mm. longo 4 mm. lato apice emarginato basi contracto ad basin  $2\frac{1}{2}$  mm. lato crassiusculo botryoideo-tuberculato, sinibus inter lobum terminalem et lobos laterales obtusis axe labelli transverse sitis. Discus ad medium labelli 2-lamellatus, lamellis 4-5 mm. longis. Labellum subtus nigro-atro-purpureum margine flavum, supra medium flavescens, lamellis discorum purpureis. Columna recta erecta 6 mm. longa 2 mm. lata subalata, pede 4 mm. longo 2 mm. lato.

HAB. Mt. Arisan, inter Funkiko et Taroyen, ad 5000 ped. alt., in arbores repens, leg. B. HAYATA et T. ITÔ, Mart., 1914.

Near *E. arisanensis* HAYATA, but differs from it in having much larger leaves, pseudobulbs and flowers.

***Eria plicatilabella* HAYATA sp. nov.** (Fig. 23). Caulis pauci-ramosus vaginatus, vaginis late cylindricis  $1\frac{1}{2}$  cm. longis 8 mm. latis apice obtusis vel

obtusissimis nervosis scariosis ore oblique truncatis imbricatis. Folia versus apicem caulis conferta lineari-lanceolata 18 cm. longa 18 mm. lata apice acuminato-attenuata ad summum obtuso-mucronata basi gradatim angustata supra basin leviter contracta ad basin  $\pm$  dilatata 9-nervia, nervis utraque pagine elevatis, basi cum petiolis articulata, petiolis brevissimis 3 mm. longis latis-simis caulem semi-amplectantibus. Racemi axillares 10 cm. longi ferrugineo-

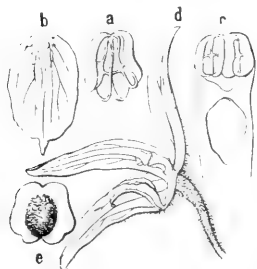


Fig. 23, *Eria plicatilabellu* HAYATA; a, a flower; b, a lip; c, a column; d, an operculum; e, the same seen from back.

tomentosis, bracteis ovatis apice acutis 6 mm. longis  $2\frac{1}{2}$  mm. latis reflexis subglabris, pedicellis brevissimis 2 mm. longis tomentosis, ovariis 3-4 mm. longis sursum latioribus tomentosis. Sepalum posticum oblongo-lanceolatum 7 mm. longum  $2\frac{1}{2}$  mm. latum apice obtusum basi non vel vix contractum 3-nerviū extus tomentosum intus glabrum, lateralia oblique oblonga 7 mm. longa  $2\frac{1}{2}$  vel 3 mm. lata apice obtusa basi pede columnæ adnata mentum 2 mm. longum formantia extus tomentosa intus glabra 3-nervia. Petala oblique lineari-lanceolata  $6\frac{1}{2}$  mm. longa 2 mm. lata 3-nervia glabra apice obtusa basi vix contracta. Labellum oblongum  $3\frac{1}{2}$  mm. longum  $1\frac{1}{2}$  mm. latum apice cuspidatum glabrum margine minute ciliolatum dimidium inferius re erecto-plicatum dimidium superius descendento-plicatum apice cuspidatum basi auriculato-rotundatum ad extremitatem valde contractum ad contractionem  $\frac{1}{3}$  mm. latum. Columna 2 mm. longa  $\pm$  recurva basi ad pedem anteriore recurvum 2 mm. longum producta.

HAB. Formosa: loco non indicato, cult. in Taihoku seminario, leg. B. HAYATA, Mart., 1914, (fl).

Near *E. tomentiflora* HAYATA, but differs from it by the longer and thinner leaves, and by the much larger flowers.

***Eria septemlamella* HAYATA sp. nov.** (Fig. 24). Radices e basi pseudobulbi oriundæ incrassatæ. Pseudobulbi ellipsoidei 3-4 cm. longi 18 mm. lati squamis lanceolatis 2-5, 2-10 cm. longis obteeti. Folia 2 ad apicem

pseudobulbi sita oblanceolata circ. 30 cm. longa 5 cm. lata plus minus obliqua apice acuminata basi longe attenuata plicata basin scapi amplexantia in exsiccato membranacea, nervis et venis parallelis utraque pagine elevatis. Scapi 20 cm. longi, pedunculis 6 cm. longis, partibus floriferis 14 cm. longis racemosis densiuscule floriferis, floribus subdescendentibus, pedicellis (cum ovariis) 1 cm. longis, bracteis minutis. Sepalum posticum lineari-angustatum

12 mm. longum basi latissimum 3 mm. latum apice obtusum 3-5-nervium, lateralia valde obliqua triangulari-oblonga desuper recurva 1 cm. longa basi latissima 6 mm. lata apice obtusa 5-nervia. Petala linearia  $\pm$  recurva 11 mm. longa 2 mm. lata 5-nervia apice obtusa. Labellum ad apicem pedis columnæ articulatatum ovato-rhomboidum 9 mm. longum 6 mm. latum subplicatum columnam semi-amplectans medio desuper recurvum basi cuneatum sursum 3-lobum, lobo

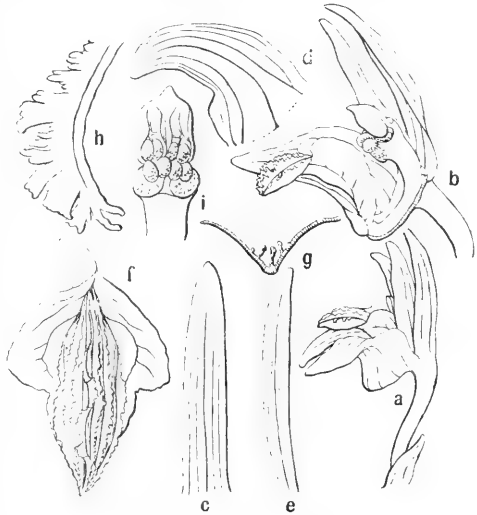


Fig. 24, *Eria septemlamella* HAYATA; a, a flower; b, the same, a lateral sepal taken off, to show the lip, mentum and column; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, cross section of the same, to show the lamellate discs; h, a lamellate disc; i, apical portion of a column, anther lifted.

terminali oblongo-triangulari  $3\frac{1}{2}$  mm. longo 3 mm. lato apice obtuso facie lamellis 7 instructo, lamellis undulato-crispatis, mediis 3 mm. longis circ. 1 mm. latis, lobis lateralibus semi-oblongis erectis columnam semi-amplectantibus  $2\frac{1}{2}$  mm. longis vel latis. Disci 7-lamellati, lamellis a basi labelli usque ad basin lobi terminalis sitis 3 non crispatis. Columna 3 mm. longa, pede 5 mm. longo. Pollinia 8.

HAB. Rinkihö, 1911, Aug., leg. H. INABA.

Near *E. Corneri* REICHB. f., but differs from it by 7 lamellate discs on the terminal lobe of the lips; also near *E. fragrans* REICHB. f. (Ann. Roy. Bot. Gard. Cale. VIII. t. 168), but, distinguishable from it in having smaller flowers with lips with 7 lamellate discs.

*Phreatia* LINDL.

**Phreatia Morii** HAYATA sp. nov. (Fig. 25). Epiphyta. Caulis foliatus basi pseudobulbosus 2-3 cm. longus basi 1 cm. latus basi squamis 1-2 involueratus. Folia ad apicem pseudobulbi gemina lanceolata 10 cm. longa 17 mm. lata apice obtusa basi plicatim attenuata cum vaginis articulata crassiuscula. Scapi a basi pseudobulbi oriundi 30 cm. longi graciles deorsum vaginati, partibus vaginatis 20 cm. longis, vaginis 13 mm. longis 3 mm. latis apice obliquis a se 4-5 cm. remotis scariosis, partibus floriferis 10 cm. longis spiciformibus densiuscule floratis, bracteis ovatis 5 mm. longis 2 mm. latis apice acutis, pedicellis subnullis, ovariis  $2\frac{1}{2}$  cm. longis obovoideis apice truncatis basi attenuatis. Sepalum posticum triangulari-oblongum  $2\frac{1}{2}$  mm. longum

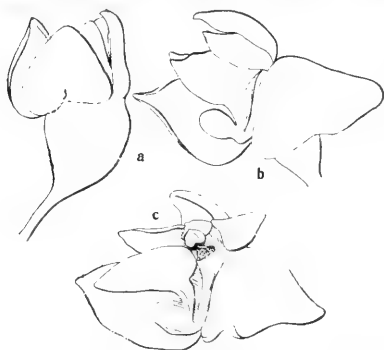


Fig. 25, *Phreatia Morii* HAYATA; a, a flower; b, the same, expanded; c, the same, petals expanded, showing the column, operculum, columnal foot and lip.

2 mm. latum apice obtusum basi latissimum valde concavum glabrum 1-nerviū, lateralia oblique triangulari-oblonga concava 3 mm. longa basi latissime  $2\frac{1}{2}$  mm. lata apice obtusa 1-nervia glabra. Petala ovato-oblonga  $2\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa 1-nervia glabra. Labelum erectum oblongo-triangulare 2 mm. longum  $1\frac{1}{3}$  mm. latum apice acutum basi abrupte truncato-contractum ad unguem  $\frac{1}{3}$  mm. longum totiusque latum abeunt, ungue basi pede colum-

næ connato calcar breve sacciforme  $\frac{1}{3}$  mm. longum formanti. Columna subnulla  $\frac{1}{3}$  mm. longa basi in pedem circ. 2 mm. longum producta; dimidium

pedis cum sepalis lateralibus connatum, dimidium liberum apice cum basi unguis labelli connatum sacculum formans; rostellum 2-lobum, lobis acuminatis; anthera late triangulari-rotundata  $\frac{2}{3}$  mm. longa; pollinia 8.

HAB. Loco non indicato, leg. U. MORI, 1910.

Near *Phreatia nebularis*, *P. saccifera* and *P. elegans*; but it does not accord with neither in the shape of the leaves, pseudobulbs and flowers.

***Phajus* LOUR.**

***Phajus gracilis* HAYATA** (Fig. 26) Mater. Fl. Formos. p. 322. Caules 40–50 cm. longi, racemis a basi caulium emergentibus. Folia elongata plicata in petiolum longum contracta, laminis obovato-oblongis 20 cm. longis  $6\frac{1}{2}$  cm. latis apice obtuse acuminatis basi distincte contractis, petiolis 2–3 cm. longis basi vaginatis, vaginis 8 cm. longis striatis. Racemi cum pedunculis 30 cm. longi erecti graciles, partibus floriferis 8 cm. longis laxifloratis, bracteis oblongo-lanceolatis  $1\frac{1}{2}$  cm. longis, floribus majusculis  $3\frac{1}{2}$  cm. longis (præter ovarium). Sepala libera patentia, posticum angustatum  $3\frac{1}{2}$  cm. longum 1 cm. latum utrinque obtusum, lateralia postico breviora oblonga 3 cm. longa 1 cm. lata apice plicato-acuta basi obliqua latere inferiore obscure auriculata. Petala sepal opostico angustiora spathulata 3 cm. longa 6 mm. lata apice obtusa basi attenuata. Labellum erectum cucullatum 28 mm. longum 25 mm. latum (expanso) basi in calcar rectum 1 cm. longum productum 3-lobatum, lobis lateralibus amplis erectis columnam involventibus apice undulatis, lobo medio expanso latiore  $1\frac{1}{2}$  cm. lato 8 mm. longo patenti margine undulato apice emarginato-2-lobulato prope basin lamellato-tuberculato, lamellis medio incrassatis hirsutis cæterum glabris. Columna longiusecula 2 cm. longa 2-alata apice clavata, alis latioribus.

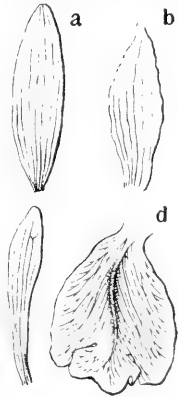


Fig. 26, *Phajus gracilis* HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, a lip.

HAB. Kōshūn: Botansha, leg. G. NAKAHARA, Dec. 1906, (No. 788).

***Phajus undulatomarginata* HAYATA** sp. nov. (Fig. 27.) Terrestis. Pseudobulbi ovato-fusiformes  $2\frac{1}{2}$ –3 cm. longi 8 mm. lati apice attenuati basi rotundati apice 2–3-foliati. Folia lanceolata 20 cm. longa  $3\frac{1}{2}$  cm. lata apice

acuminata basi attenuata ad petiolum vaginiformem abeuntia, nervis manifestis 3, exsiccatō membranacea indigo-colorata, vaginis 10 cm. longis. Scapi

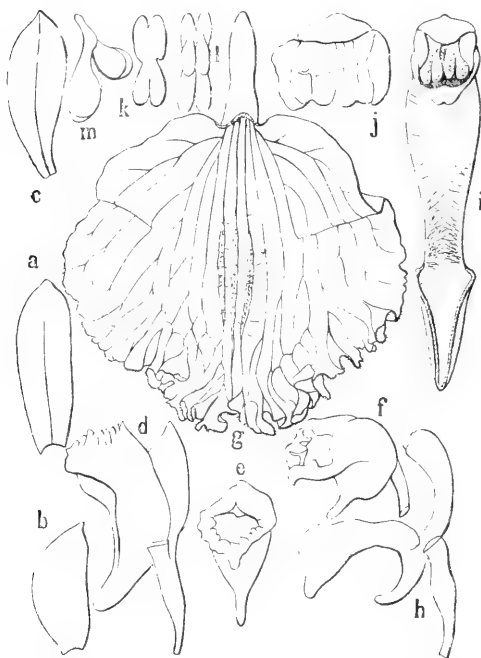


Fig 27, *Phajus undulatomarginata* HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, e, f, a lip, seen from different sides; g, a lip, unfolded; h, a column with a lip and spur; i, a column with a basal portion of a spur; j, an operculum lifted, seen from front; k, pollinia, seen from front; l, the same, seen from back; m, the same, seen from side; a—f, and h, nearly natural size; others variously magnified.

aphylli 25 cm. longi vaginati, vaginis 3 cm. longis 6–7 mm. latis apice acutis, partibus floriferis 8 cm. longis, bracteis obovatis  $1\frac{1}{2}$  cm. longis 1 cm. latis apice acuminatis basi amplexicaulibus. Sepalum posticum angustato-oblongum 3 cm. longum 1 cm. latum apice obtusum basi leviter contractum 4 mm. latum, lateralia postico latiora obliqua 12 mm. lata breviora  $2\frac{1}{2}$  cm. longa 7-nervia. Petala oblanceolata vel obovato-spathulata 3 cm. longa 1 cm. lata deorsum cuneato-attenuata ad basin 2 mm. lata 7-nervia. Label-

lum explicato late rotundatum  $2\frac{1}{2}$  cm. latum totiusque longum apice sub-emarginatum basi contractum, ad orem calcaris 3 mm. latum, lobis lateralibus amplis erectis semioblongis 2 cm. longis 8 mm. latis margine latere integris



non plicatis, margine anteriore valde plicato-undulatis ad lobum centralem gradatim abeuntibus lobo centrali brevissimo obscuro apice emarginato margine valde undulato-plicato, facie medio discis 3-5-striatis hirsutis instructum basi medio hirsutum calcaratum, calcar circ 8 mm. longo 2 mm. lato vel latiore intus hirsuto. Columna  $1\frac{1}{2}$  cm. longa 2 mm. lata 2-alata intus dense hirsuta. Rostellum validiusculum semirobundatum antice productum apice rotundatum.

HAB. Shintengai, leg. R. KANEHIRA, Mai., 1912.

Somewhat near *Phajus maculata* LINDL. (Ann. Roy. Bot. Gard. Calc. VIII. t. 149) in the shape of the lips which are undulately plicate at the margin, but greatly different from it in having much smaller form, lanceolate leaves with long petioles.

### *Tainia* BLUME.

***Tainia cordifolia*** HOOK. f. in HOOK. Ic. Pl. XIX. t. 1861; HAYATA et MATSUM. Enum. Pl. Formos. p. 410.

*Tainia Fauriei* SCHLECHT. FEDD. Rep. IX. 1911, p. 282.

HAB. in montibus Kussaku, leg. U. FAURIE, 1903 (No. 539).

SCHLECHTER'S *Tainia Fauriei* is the same species as a plant mentioned in our work as *Tainia cordifolia* HOOK. f., as it was collected by the same collector at the same place and distributed with the same number. At Kew, I compared my plant with the type of this species, and found it to be identical with the same.

***Tainia unguiculata*** HAYATA sp. nov. (Fig. 28) = *Tainiopsis unguiculata* HAYATA in sched. Herb. Tōkyō. Radices incrassatæ; rhizoma subrepens ascendens ramosum teres in exsiccato 4 mm. in diametro, internodiis 7-10 mm. longis, ad nodos squamis unis instructis, squamis ovatis scariosis 3-4 cm. longis 2 cm. latis apice acuminatis basi rhizoma amplexantibus. Folia ad apicem rhizomatis rami solitaria longe petiolata lanceolata (duplicato-plicata) 25 cm. longa 6-7 cm. lata apice acuta vel acuminata basi longe attenuata 5-nervia, nervis parallelis, intra nervos 6-vena, venis parallelis, in exsiccato membranacea, petiolis 5 cm. longis apice cum laminis folii articulatis teretibus multisulcatis basi cum rhizomate articulatis. Scapi ad apicem rami rhizomatis solitarii vel gemini circ. 10 cm. longi vaginis scariosis ovatis obtekti, vaginis apice acuminatis 2-3 cm. longis quam internodio longioribus. Flores solitarii vel pauci-racemosi, bracteis ovatis

acuminatis  $2\frac{1}{2}$  cm.  
 longis alabastrum  
 floris amplexantibus,  
 pedicellis 5  
 mm. longis, ovariis  
 1 cm. longis linearibus  
 gracilibus  $\frac{1}{2}$   
 mm. in diametro  
 sulcatis. Flores  
 patentes 4 cm.  
 longi totiusque  
 lati. Sepalum pos-  
 ticum oblongo-  
 obovatum 23 mm.  
 longum 10 mm.  
 latum basi fere  
 haud contractum,  
 sepala lateralibus  
 magna oblique tri-  
 angularia latere  
 superiore 2 cm.  
 longa latere in-  
 feriore 3-4 cm.

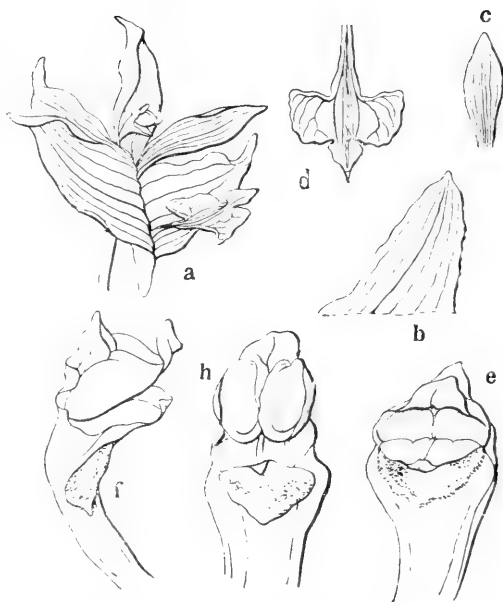


Fig. 28, *Tainia unguiculata* HAYATA; a, a flower, expanded; b, a detached lateral sepal; c, a petal; d, a lip; e, apical portion of a column; f, the same, seen from side; h, the same, seen from front, anther lifted;

longa basi  $2\frac{1}{2}$  cm. lata apice acuta basi cum pede columnae connata mentum  
 2 cm. longum formantia, latere superiore libera, latere inferiore basi se con-  
 nata calcar 7 mm. longum 4 mm. latum formantia. Labellum ad orem  
 calcaris situm liberum longe unguiculatum, unguibus linearibus 9 mm. longis  
 4 mm. latis sursum ad laminam expansum, lamina crasiformi 3-lobata 2 cm.  
 lata  $1\frac{1}{2}$  cm. longa, lobo terminali triangulari-ovato 6 mm. longo 5 mm. lato  
 apice triangulari-acuto ad summum cuspidato-acuto basi leviter contracto ad  
 basin 3 mm. lato, lobis lateralibus divaricatis rectangulari-auriculiformibus  
 8 mm. latis totiusque longis. Discus medio labelli 1-lamellatus, lamella circ.  
 2 cm. longa crassiuscula. Columna circ. 10 mm. longa 2 mm. lata subalata

apice dilatata circ.  $3\frac{1}{2}$  mm. lata nuda, basi in mentum  $2\frac{1}{2}$  cm. longum producta, stigmatibus triangularibus. Rostellum triangulare, latere clinandri ultra insertionem antherarum productum. Anthera ovata 2-locularis cum appendice 4 mm. longa, appendice connectivi antice producto, sessilis dorso 2-cucullata.

HAB. Formosa: loco non indicato: cult. in seminario, Taihoku.

Near *Tainia cordifolia* HOOK. f.; but differs by the much broader sepals, unguiculate lips, and much narrower lanceolate leaves.

It is with some hesitation that I have referred this plant to *Tainia*. It bears some resemblance to *Tainia* and *Acanthehippium* in its terrestrial habit, large membranous plicate petiolate leaves, few-large-flowered short lateral racemes, and in having lateral sepals adnating to the foot of the column, erect petals, footed column and 8 pollinia. Besides, it resembles the former more affirmatively by the long slender column with wings towards the apex and solitary leaves; while its affinity with the latter is more emphasized by the short lateral sheathed raceme, lateral sepals adnating to the long foot of the column to form a large pouch-like spurred mentum, mobile small stipitate lips with broad incurved lateral lobes and a small triangular terminal lobe, and long footed column. But it differs from *Tainia* on one hand by the short few flowered sheathed raceme, lateral sepals adnating to the long foot of the column to form a large pouch-like spurred mentum, mobile small stalked lip with broad incurved lateral lobes and a small triangular terminal lobe, and by long footed column; while on the other it is distinguishable from *Acanthehippium* by the long slender column winged towards the apex, solitary leaves, not fleshy flowers, and free sepals. Upon considering all the characters above mentioned, I am very much inclined to regard the plant as representing a new genus, *Tainiopsis*, just intermediate between the two named genera. What is rejected from one genus is accepted by the other, and *vice versa*. The two (*Tainia* and *Acanthehippium*) may be united to one and the same genus, when the characters which separate each other are connected by the one represented by this new orchid; or the three may be regarded as distinct. In my opinion, however, the new genus *Tainiopsis* should be regarded as a valid one, so long as the two (*Tainia* and *Acanthehippium*) should stand as distinct ones.

*Pleione* DON.

***Pleione formosana* HAYATA** Mater. Fl. Formos. p. 326. *Catalogue formosana* HAYATA in sched. herb. Taihoku. Descriptio auctata. Pseudobulbi ampullaeformes apice rostrati cum rostris 3 cm. longi 17 mm. lati basi globosi, partibus globosis 17 mm. in diametro, partibus rostratis 1 cm. longis  $\frac{1}{2}$  cm. latis apice truncatis. Sepala petalaeque purpureo-rosea. Labellum album versus discos maculatum. Pedunculi 20 cm. longi, fructus singulos gerentes. Capsula clavato-cylindrica  $\pm$  3 cm. longa 8 mm. lata apice abrupte truncata basi cuneato-attenuata 6-costata inter costas profunde sulcata, pedicellis 1 cm. longis.

HAB. Senninbora, in Mt. Arisan, ad 6000 ped. alt., leg. B. HAYATA et T. Irō, Mart., 1914.

*Pholidota* LINDL.

***Pholidota uraiensis* HAYATA** sp. nov. (Fig. 29) Rhizoma repens subteres 2 mm. in diametro, squamis scariosis dense obtectum, squamis 8–10 mm. longis deorsum vaginiformibus rhizoma complete amplexantibus apice acutis venosis se imbricatis. Pseudobulbi ascendentes 1-nodosi ovoidei apice truncato-obtusi basi rotundati  $\pm$  leviter tenuissime complanati 2 cm. longi 1 cm. lati basi squamis imbricatis in magnitudine variabilibus demum defectis dense obtecti vel basi reliquis squamarum instructi. Folia gemina terminalia ad apicem pseudobulbi sita lineari-oblongata 9 cm. longa 7 mm. lata deorsum gradatim attenuata ad petiolum  $1\frac{1}{2}$  mm. longum abeuntia ad apicem triangulari-obtusa vel obtuse mucronata, lamina subcoriacea supra plana margine desuper

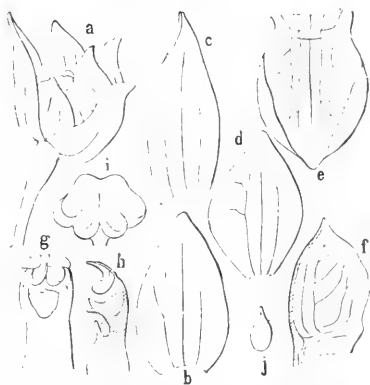


Fig. 29, *Pholidota uraiensis* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, the same in vertical section; g, a column; h, the same, in section; i, an operculum, lifted up; j, a pollinium.

recurva ad costas subsulcata, nervis venisque utraque pagine non distinctis, petiolis haud distinctis cum pseudobulbo articulatis. Scapi vel racemi e basi pseudobulbi oriundi basi squamiferi 8 cm. longi sursum filiformes, parte florifera  $2\frac{1}{2}$ –3 cm. longa, bracteis ovatis  $4\frac{1}{2}$  mm. longis 4 mm. latis valde concavis subplicatis valde acutis 5–nerviis alabastrum floris amplexantibus caducissimis post anthesin deciduis, floribus subclausis vel subpatentibus 4 mm. longis densiusculis a se 2 mm. remotis, pedicellis ascendentibus 2 mm. longis, ovariis 1 mm. longis. Sepalum posticum ovatum  $4\frac{1}{4}$  mm. longum  $2\frac{3}{4}$  mm. latum apice angulato-obtusissimum basi vix contractum 2 mm. latum planum vel leviter concavum 3–nervium, nervis parallelis, margine integrum, lateralia obliqua ovata plicato-concava æquilonga cum postico, apice obtusa basi  $\pm$  contracta 3–nervia dorso manifeste ad costam carinata, carinis infra apicem acute productis. Petala late oblonga vel late obovata 4 mm. longa 3 mm. lata apice triangulari-obtusa basi cuneato-obtusa ad basin 1 mm. lata subplana 3–nervia, nervis parallelis. Labellum valde concavum in explicato late rotundatum 3 mm. longum  $4\frac{1}{2}$  mm. latum apice late rotundatum ad centrum breve obtuse cuspidatum, (cuspidibus triangularibus  $\frac{1}{2}$  mm. longis totiusque latis ad apicem obtusis), basi contractum prope basin disco transverso versus marginem valido, ad centrum tenui uno instructum basi ad pedem columnæ affixum. Columna 2 mm. longa subteres basi in pedem circ 1 mm. longum tumidum producta. Pollinia 4.

HAB. Uraisha, leg. S. SASAKI, Jan., 1913. Remarkable for its having scapes arising from the very base of the 1-noded pseudobulbs.

*Calanthe* R. BR.

***Calanthe arisanensis*** HAYATA Mater. Fl. Formos. p. 327.

HAB. Inter Funkiko-Taroyen, leg. B. HAYATA et T. ITÔ, Mart., 1914.

Note: Flowers nearly white, ovary slightly purple. Capsules elongato-obovoid  $3\frac{1}{2}$  cm. long  $1\frac{1}{2}$  cm. broad attenuate at the base, pedicels 1 cm. long.

***Calanthe brevicolumna*** HAYATA (Fig. 30) Mater. Fl. Formos. p. 328. Caulis brevis incrassatus 1–2-foliatus. Folia sessilia oblanceolata 35 cm. longa 8 cm. lata apice acuta basi attenuata. Scapi aphylli vel 1-foliati vel vaginati 70 cm. longi validiusculi, racemis densifloratis 10 cm. longis, bracteis ovatis

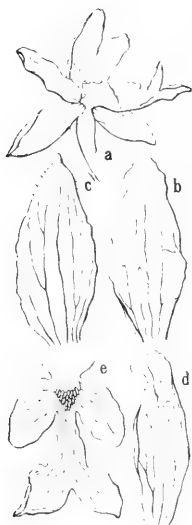


Fig. 30, *Calanthe brevicolumna* HAYATA; a, a flower; b, a uppermost sepal; c, a lateral sepal; d, a petal; e, a lip.

2 cm. longis 6 mm. latis. Flores mediocrini 2 cm. in diametro, pedicellis 5 mm. longis. Sepala æqualia erecto-patentia ovata 9 mm. longa 6 mm. lata apice obtusa basi contracta. Petala sepalis angustiora oblongo-angustata 1 cm. longa 3 mm. lata apice truncata basi angustata. Labellum sepalis longius, (unguis cum alis columnæ in tubum connatus, tubo late campanulato 3 mm. in diametro), ima basi in calcar 6 mm. longum  $1\frac{1}{2}$  mm. latum productum, calcar subrecto; lamina patens obovata in circumscriptione 8 mm. longa 5 mm. lata 3-lobata, lobo medio longiore 6 mm. longo apice divaricato-2-lobulato, (lobulis oblongo-truncatis), basi cuneato, lobis lateralibus minoribus oblique oblongis antice falcatis apice obtusis 3 mm. longis  $1\frac{1}{2}$  mm. latis; discus calloso-cristatus basi labelli 3-seriatim dispositus. Columna brevis 3 mm. longa. Clinandrium excavatum; rostellum 2-lobatum, lobis oblongis obtusis; anthera rotundata antice breve acuta. Pollinia 8 elongato-ovata apice acuminata, caudiculis brevissimis.

HAB. Taitō: Bataian, leg. T. KAWAKAMI, Aprili. 1907.

Near *C. herbacea* LINDL., but differs from it in having much shorter spurs, and in the lips, sepals, and in many other points.

***Calanthe caudatilabella* HAYATA sp. nov.** (Tab. XIII.) Pseudobulbi. . . . Folia 5-6 ex apice pseudobulbi oriunda lineari-lanceolata 20-30 cm. longa  $1-1\frac{1}{2}$  cm. lata, apice acuminata basi gradatim attenuata basi plicata in exsiccato membranacea, venis lateralibus parallelis, venis transversis tessellatis. Scapi 35 cm. longi sursum racemosi, partibus floriferis 15 cm. longis, bracteis ovato-lanceolatis apice acuminatis, floribus a se 1 cm. remotis. Sepalum posticum lanceolatum 2 cm. longum 5 mm. latum apice acuminatum basi leviter contractum, lateralia oblique lanceolata 23 mm. longa 5 mm. lata apice acuminata basi leviter contracta. Petala parva linearia 12 mm. longa 2 mm. lata apice

acuminata. Labelli lamina ovata 16 mm. longa 12 mm. lata apice breve caudata basi contracta a medio sursum 3-lobata, lobo terminali ovato circ. 1 cm. longo 6 mm. lato apice cuspidato-caudato basi contracto 4 mm. lato, lobis lateralibus late oblongis apice truncatis 4 mm. latis 3 mm. longis, margine irregulariter crenulato-denticulatum basi cum columna connatum, partibus connatis 5 mm. longis intus villosa-pilosis, pilis rectis, calcaribus linearibus 5 mm. longis 1 mm. in diametro desuper recurvatis. Discus basi laminae labelli situs 2-lamellatus. Columna brevis 4 mm. longa. Rostellum acutum apice 2-lobum, lobis acutis. Ovarium hirsutum 4 mm. longum, pedicello brevi.

HAB. Rinkiho: Gosarin, ad 7000 ped. alt., leg. H. INABA, Aug., 1912.

**Calanthe forsythiiflora** HAYATA sp. nov. (Tab. XIV.) Rhizoma erectum, radicibus incrassatis. Folia 4-3 fasciculata basi se involventia oblanceolata membranacea 40 cm. longa 6 cm. lata apice acuminata ad summum acuta basi gradatim attenuata, partibus attenuatis 13 cm. longis, nervis principalibus 5, inter nervos venis 12, venulis transversis tessellatis. Scapi e basi fasciculi foliorum oriundi 30-40 cm. longi aphylli vaginati, vaginis scariosis  $3\frac{1}{2}$  cm. longis 6 mm. in diametro apice acutis ore obliquissimis a se 8 cm. remotis, partibus floriferis 8 cm. longis flores flavos racemosim gerentibus, floribus a se 1 cm. remotis horizontaliter patentibus vel sub nutantibus subsecundum dispositis, bracteis valde caducis non visis, pedicellis (cum ovario 7 mm. longis) 4 mm. longis. Sepalum posticum obovatum 8 mm. longum 4 mm. latum apice acutum vel aristato-acutum basi  $\perp$ formiter insertum 3 mm. latum 3-5-nerviium, lateralia oblique ovata vel obovata postico conformia. Petala tenuissima late ovata  $\pm$  obliqua 7 mm. longa 4-5 mm. lata apice subito acuta vel mucronato-acuta basi contracta  $1\frac{1}{2}$  mm. lata 3-nervia, nervis parallelis, valde concava. Labellum basi cum columna connatum, lamina late rotundato-reniformi  $3\frac{1}{2}$  mm. longa  $5\frac{1}{2}$  mm. lata apice late rotundata ad centrum emarginata ad medium partis emarginatae breve mucronata basi contracta 2 mm. lata basi utraque latere auriculis instructa, auriculis semirotundatis  $\frac{1}{2}$  mm. longis totiusque latis, multinerviium basi medio discis 2 instructum, discis auriculiformibus  $\frac{1}{2}$  mm. longis  $\frac{1}{4}$  mm. latis lamelliformibus, calcaribus  $\pm$  recurvis  $3\frac{1}{2}$  mm. longis apice  $\pm$  dilatatis  $1\frac{1}{2}$  mm. in diametro. Columna 2 mm. longa; clinandrium concavum. Pollinia 8.

HAB. Kōshun, leg. T. KAWAKAMI et T. ITŌ, 1909, Juni.

Very near *C. Mannii* HOOK. fil. in Orch. Sikk. Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 225, in its external appearance, but differs by the quite yellow flowers with quite different lips.

***Calanthe graciliflora*** HAYATA (Fig. 31) Mater. Fl. Formos. p. 329.

Folia 2-3 oblongo-spathulata cum vaginis 30 cm. longa  $6\frac{1}{2}$  cm. lata apice acuminata basi gradatim attenuata ad vaginam abeuntia utrinque glabra plicato-plana. Scapi graciles 60 cm. longi, racemis laxifloratis, floribus mediocribus  $3\frac{1}{2}$  cm. in diametro, bracteis lanceolatis scariosis 1 cm. longis tenuibus, pedicellis gracilibus 1 cm. longis, petalis et sepalis valde postice reflexis, labello antice horizontaliter patenti. Sepala subæqualia oblongo-lanceolata 2 cm. longa 6 mm. lata apice aristato-acuminata basi leviter contracta 5-nervia extus breve hirtellata. Petala sepalis angustiora ob-lanceolata apice acuta basi attenuata 18 mm. longa 4 mm. lata 3-nervia. Labellum antice patens; unguis cum alis columnæ in tubum

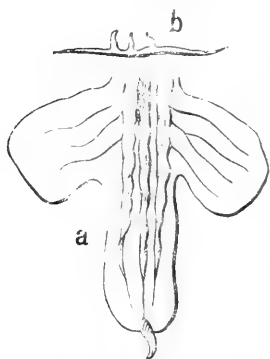


Fig. 31, *Calanthe graciliflora* HAYATA; a, a lip; b, section of a basal portion of the same.

connatus, tubo angusto (ore 2 mm. in diametro intus hirtellato) ima basi attenuato in calcar 12 mm. longum 1 mm. latum producto, calcar extus et intus hirtellato; lamina labelli rotundata in ambitu 1 cm. longa totiusque lata 3-lobata, lobo medio angusto 5 mm. longo 2 mm. lato apice emarginato-aristato, aristis 1 mm. longis desuper reflexis, lobis lateralibus quadrangulato-rotundatis 4 mm. longis totiusque latis oblique divaricatis; discus calloso-lamellatus, lamellis 3. Columna brevis 5 mm. longa clavata. Clinandrium excavatum, lobo posteriore truncato, anteriore (rostello) 2-lobato, lobis dentiformibus. Anthera opercularis incumbens, postice cordata antice acuminata 3 mm. longa distincte 2-locularis, loculis distincte 2-locellatis. Pollinia 8 subcomplanata elongato-ovata apice attenuata  $1\frac{1}{2}$  mm. longa caudiculis connata, caudiculis 1 mm. longis.



HAB. Nanō, Kimmonsha, ad 3200 ped. alt., Aprili. 1909, (No. 15), leg. U. MORI.

Near *C. Henryi* ROLFE., but differs from it by the much narrower leaves and by the lips with very much divaricate side-lobes which are inserted at nearly 90°. In the other species they are inserted at an acute angle and nearly as long as the middle lobe. Sepals and petals greenish red, rosaceous on the outer side, but greenish yellow on the inner; lips whitish; column light rose.

***Calanthe Kawakamii* HAYATA** (Fig. 32) Mater. Fl. Formos. p. 330.

Caulis brevis in pseudobulbum late globosum 1 cm. longum incrassatus basi vaginatus supra basin foliatus. Folia oblonga 20 cm. longa 9 cm. lata apice breve acuta basi abrupte ad vaginam contracta plicatoplane. Scapi 40–50 cm. longi graciles basifoliati vel aphylli vaginati, racemis laxe floratis, floribus breve pedicel latis, bracteis lanceolatis 1 cm. longis. Flores majusculi 3½ cm. longi, pedicellis 5 mm. longis. Sepala inaequalia extus brevissime hirtellata, posticum majus ovato-oblongum 33 mm. longum 15 mm. latum apice breve cuspidatoacutum basi contractum, lateralia angustiora oblongo-lanceolata 3 cm. longa 1 cm. lata apice obtuse acuminata basi angustata. Labelli unguis alis columnæ in tubum campanulatum (ore 5 mm. in diametro) connatus, ima basi in calcar 7 mm. longum rectum productus, lamina patens 2 cm. longa totiusque lata profunde

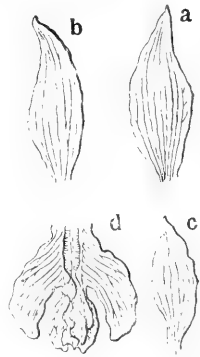


Fig. 32, *Calanthe Kawakamii* HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, a lip.

3-lobata, lobo medio obovato-oblongo 13 mm. longo 9 mm. lato apice emarginato ad sinus breve aristato basi angustato, lobis lateralibus divaricatis cultriformibus 1½ cm. longis 8 mm. latis apice rotundatis; discus 4-lamellatus, lamellis supra medium laminarum sitis, 2-lateralibus a medio deorsum intus dense pilosis. Columna lata brevis 8 mm. longa, alis cum ungue labelli connatis. Clinandrium profunde excavatum oblique truncatum, lobo anteriore (rostello) oblique erecto 2-lobato, lobis dentiformibus; anthera ad apicem membranarum posteriorum clinandrii affixa incumbens cordato-ovata apice obtuse

acuminata 7 mm. longa 4 mm. lata 2-locularis. Pollinia 8, in singulo loculo 4, cerea oblonga plus minus complanata apice attenuata basi rotundata circ.  $2\frac{2}{3}$  mm. longa apice caudiculis connata, caudiculis filiformibus  $2\frac{1}{2}$  mm. longis.

HAB. Shintiku: Gakokeizan, leg. T. KAWAKAMI et K. WATANABE, Aprili. 1907.

**Calanthe lamellata** HAYATA sp. nov. (Fig. 33.) Caulis 20-30 cm. longus gracilis infra medium 2-3-foliatus sursum racemosus, racemis circ. 10 cm. longis. Folia 3-4 ovato-oblonga 15 cm. longa 6-7 cm. lata apice subito acuta basi attenuata sessilia caulem amplexantia margine integra vel leviter crispata, venis nervisque vena marginali connectis, bracteae ovate vel ovato-lanceolatae 7 mm. longae. Sepala subaequalia; posticum ovato-oblongum 23 mm. longum 10 mm. latum apice acutum basi plus minus contractum margine non recurvum 5-nerviū, lateralia postico conformia. Petala ovato-

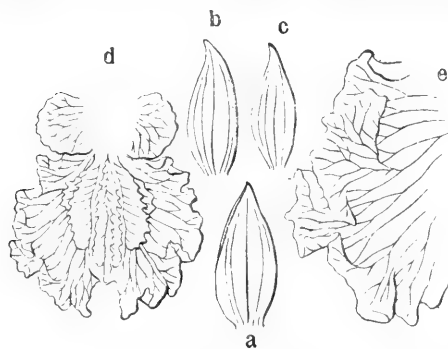


Fig. 33, *Calanthe lamellata* HAYATA; a, an uppermost sepal; b, a lateral sepal; c, a petal; d, labellum; e, margin of the same.

oblonga  $1\frac{1}{2}$  cm. longa 5 mm. lata apice acuta basi plus minus contracta 3-nervia vel obscure 5-nervia. Labellum ecalcaratum obovatum 2 cm. longum totiusque latum apice profunde emarginatum vel leviter 2-lobum ad centrum apicis brevissime triangulare acutum vel mucronato-acutum basi contractum plus minus cordatum 3-lobum, lobis basilaribus (lateralibus) auriculiformibus 5 mm. longis totiusque latis vel quadrangularibus margine crenulatis, lobo terminali reniformi-rotundato  $1\frac{1}{2}$  cm. longo 2 cm. lato basi contracto 2 mm. lato apice leviter bilobato ad centrum apicis brevissime acuto margine valde undulato-plicato-crispato. Discus ad medium lobi terminalis situs longitudinaliter 3-5 lamellatus, lamellis circ. 1 cm. longis 2 mm. latis, margine crispatis. Columna brevis.

HAB. Mt. Rontabun, leg. U. MORI, Aprili. 1910.

Remarkable for the broadly lamellate discs and for the leaves with a marginal vein connecting all other veins. Very near *C. tricarinata* LINDL., (Ann. Roy. Bot. Gard. Cale. IX. t. 103), but differs from it by the slightly longer terminal lobes of the lips which are much more strongly undulately folded at the margin and by the leaves which have veins running towards the margin, and a marginal vein connecting all other veins.

***Calanthe reflexa* MAXIM.** (Fig. 34).

HAB. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. HAYATA, Aprili. 1914.

Compared with a specimen of the species in the Tōkyō herbarium.

Note: Flowers slightly yellow.

***Calanthe Sasakii* HAYATA sp. nov.** (Fig. 35.) Caulis 30–50 cm. longus basi vaginatus, vaginis 5 cm. longis 1 cm. latis apice acutis scariosis nervosis. Folia saepe gemina lanceolata 30–40 cm. longa 5 cm. lata apice acuta basi gradatim attenuata ad petiolum 10 cm. longum abeuntia in exsiccato membranacea. Partes caulis floriferae 10 cm. longae laxiuscule floratae, floribus a

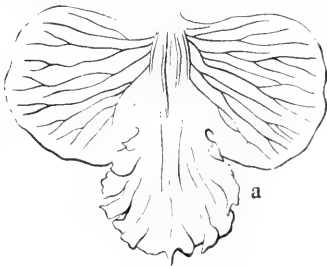


Fig. 35, *Calanthe Sasakii* HAYATA; a, a lip.

sepalis breviora 18 mm. longa  $4\frac{1}{2}$  mm. lata apice acuminata basi 2 mm. lata 3-nervia. Labelli lamina sessilis basi calcarata flabelliformis basi  $\pm$  cordata 1 cm. longa  $1\frac{1}{2}$  cm. lata 3-lobata, lobo centrali 15 mm. longo 6 mm. lato apice emarginato ad centrum aristato margine valde plicato-crispato, lobis lateralibus lobo terminali latioribus margine subintegris  $\pm$  crispatis; calcaribus



Fig. 34, *Calanthe reflexa* MAX., natural size.

apice usque ad laminam labelli 2 cm. longo apice subrecto acuto. Discus basi laminæ 3-striatim dispositus obscurus. Columna 5 mm. longa  $\pm$  dorso recurva.

HAB. Akô, Mt. Buyesan, leg. S. SASAKI, Mart., 1910.

*Eulophia* R. Br.

***Eulophia brachycentra*** HAYATA sp. nov. (Fig. 36, a) Fasciuli foliorum basi vaginati, vaginis 3-4, 10-20 cm. longis inferiore cylindraceis superiore lanceolatis. Folia 3-4-fasciculata lineari-lanceolata circ. 50 cm. longa 12 mm. lata apice acuminata basi gradatim attenuata inferiore prope basin vaginata se amplectantia supra minute elevato-venulosa subtus prominente 3-nervia, nervis elevatis, minute venulosa. Scapi (racemi) 75 cm. longi folia multo superantes, parte non florifera 62 cm. longa ad nodos vaginata, vaginis cylindraceis 10 cm. longis sursum lanceolatis acuminatis, parte florifera 10-13 cm. longa densiuscule florata, floribus a se 1 cm. remotis, bracteis glabris lanceolatis 1 cm. longis apice acuminatis, pedicellis cum ovariis 15-20 mm. longis, floribus apertientibus 25 mm. in diametro, sepalis petalisque patentissimis. Sepalum posticum obovato-oblongum 13 mm. longum 6 mm. latum apice obtusum ad summum apiculatum, (apiculo desuper recurvo), basi  $\pm$  contractum 2 mm. latum 7-9-nerviis margine planum prope apicem interiore recurvum glabrum, lateralia cum postico conformia  $\pm$  obliqua. Petala oblonga sepalo postico latiora 13 mm. longa 7-8 mm. lata apice obtusissima basi contracta obtusissima 2 mm. lata 7-nervia. Labellum erecto-patens late obovatum 1½ cm. longum 14 mm. latum glabrum basi subcalcaratum vel menti-forme (mento 4 mm. longo) 3-lobatum, lobis lateralibus (basilaribus) semi-oblongis apice rotundatis 3-4 mm. latis



Fig. 36, a, *Eulophia brachycentra* HAYATA; b-h, *Eulophia ramosa* HAYATA; b, a flower; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, a column, seen from front; h, the same, seen from side; b, natural size, others more or less magnified.

suberectis margine integris, loboterminali oblongo 7-8 mm. longo 7 mm. lato apice perfecte rotundato basi non contracto margine sursum undulato plicato. Discus

a prope apicem ad supra basin situs 5-striato-lamellatus, lamellis sursum convergentibus crassiusculis crispatis medio tenuissimis vel ad nullum reductis evanescentibus deorsum prominentibus latoribus, partibus latoribus circ. 1 mm. latis. Columna 8 mm. longa semiteres  $\curvearrowright$ -formis in sectione subapoda? Pollinia 2 globosa, stipite lineari  $1\frac{1}{2}$  mm. longo  $\frac{1}{3}$  mm. lato.

HAB. Taitō: Shinkōgai, leg. Z. KOBAYASHI, Juni., 1906, fl.

Near *Eulophia herbacea* LINDL. (Ann. Roy. Bot. Gard. Calc. XI. part 2, t. 106.), but differs from it by the narrower leaves, lamellate discs, undulate margins of the lips and by many other points.

**Eulophia ramosa** HAYATA (Fig. 35, b-h), Mater. Fl. Formos. p. 332. Caulis circ. 50 cm. longus glaber angulatus striatus basi squamatus, (squamis amplexicaulibus ovatis acutis 15 mm. longis), superiore racemosus. Folia (KAWAKAMI, No. 6281) inferiora lanceolato-lineariter 20 cm. longa 6 mm. lata basi amplexicaulia ad vaginam attenuata, superiora minora lineariter 3-6 cm. longa amplexicaulia plicata. Racemi 20-25 cm. longi pauci-ramosi, ramis gracilibus erectis. Flores erecto-ascendentes 15 mm. longi, pedicellis cum ovario 15 mm. longis, bracteis ovatis acuminatis pedicellum amplexantibus 7 mm. longis. Sepala æquiformia lanceolato-angustata 12 mm. longa  $2\frac{1}{2}$  mm. lata apice acuta basi leviter angustata erecta. Petala sepalis latiora plus minus breviora 11 mm. longa  $3\frac{1}{2}$  mm. lata lanceolato-obovata apice acuta erecta. Labellum a basi columnæ erectum obovatum sepalum in longitudine æquans 11 mm. longum 8 mm. latum, inter sepala lateralia in calcar gibbosum 2 mm. longum ad apicem leviter contractum productum, supra basin contractum 3-lobatum, lobis lateralibus erectis columnam amplexantibus latissimis margine latere integris antice eroso-denticulatis apice obtusis, lobo centrali patenti globoso-obovato 4 mm. longo 5 mm. lato apice rotundato-truncato basi leviter contracto ad basin 3 mm. lato. Discus medio a basi labellorum usque ad medium 3-lamellatus, (lamellis utrinque ramosis), etiamque ad paginam lobi centralis a medio usque ad prope apicem fimbriato-cristatus. Columna brevis crassa apoda sæpius 2-alata. Ovarium cylindricum sulcatum 6 mm. longum.

HAB. Nōkōzan, leg. T. KAWAKAMI et U. MORI, 1908, Jan. (No. 6281).

The present species is near *E. taiwanensis* HAYATA, from which it differs in having branched inflorescence and smaller flowers with slightly denticulate lips.

*Cymbidium Sw.*

**Cymbidium albo-jucundissimum** HAYATA sp. nov. Pseudobulbi annotini conico-ovati 6 cm. longi  $2\frac{1}{2}$  cm. lati infra medium latissimi subcomplanati circ. 4-nodosi, internodiis longioribus  $1\frac{1}{2}$  cm. longis, brevioribus 8 mm. longis. Folia lanceolata 30 cm. longa 22 mm. lata apice acuminata basi cum petiolis articulata supra nitida viridia subtus opaca margine sub lente suberosa, costis subtus acuto-elevatis, nervis lateralibus principalibus utroque latere costae 2, crasso-coriacea, petiolis 2 cm. longis subplicatis in explicato 12 mm. latis. Scapi vel racemi 30 cm. longi. Flores apertientes 4 cm. in diametro, pedicellis cum ovariis 12 mm. longis, albescens. Sepalum posticum obovato-lineari-lanceolatum 23 mm. longum 4 mm. latum apice acuminatum basi vix contractum 2 mm. latum 5-nerviis planum margine integrum planum, lateralia cum postico conformia. Petala ovato-lanceolata 2 cm. longa 5 mm. lata apice acuta basi obtusa 5-nerviis margine interiore recurva basi 1 mm. lata. Labellum ovatum  $1\frac{1}{2}$  cm. longum 11 mm. latum, hypochilo 8 mm. longo 11 mm. lato rotundato erecto basi rotundato-contracto  $2\frac{1}{2}$  mm. lato facie glabro medio disco 2-lamellato instructo, lamellis subadnatis ( )-formiter dispositis, latere erecto, epichilo desuper recurvo oblongo facie dense brevissime muricato-hirtello 8 mm. longo 7 mm. lato apice obtusissimo ad summum brevissime triangulare apiculato vel non apiculato sursum prope apicem margine interiore subrecurvo. Columna 12 mm. longa  $3-3\frac{1}{2}$  mm. lata complanato-semiteres subalata.

HAB. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. HAYATA, 1914, Mart.

Near *C. sinense* WILLD., but differs from it by the smaller nearly white flowers, in the maculation of the lips and in more hirsute terminal lobe of the latter.

**Cymbidium aloifolium** SWARTZ (Fig. 37, et 38-a); Orch. Sikkim Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 252.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. T. SŌMA, Aug. 1913, (fl.).

Columnal foot is more conspicuous in our plant than in the figure in the above-mentioned work. The following description is drawn from our specimens.

OBSERV. Folia crassa linearia 30-60 cm. longa  $1\frac{1}{2}$  cm. lata in vivo supra

nitida viridissima, venis non visis, ad costam tenuiter sulcata subtus pallidiora, costis elevatis, margine desuper recurva apice inaequaliter emarginata vel inaequaliter 2-loba, (lobo longiore 2 mm. longo 7 mm. lato apice rotundato, lobo brevior subnullo), basi non angustata plicata cum vaginis articulata. Scapi vel racemi penduli 32 cm. longi, partibus basilaribus non floriferis 8 cm. longis, partibus floriferis 24 cm. longis, floribus a se 4 cm. remotis, bracteis lanceolatis 2 cm. longis pedicellum vix superantibus, pedicellis cum ovariis 2 cm. longis patentibus gracilibus glabris. Flores 3-4 cm. in diametro, sepalis valde reflexo-retrorsis, labello suberecto. Sepalum posticum lineari-lanceolatum 2 cm. longum apice acutum basi vix vel haud angustius  $2\frac{1}{2}$  mm. latum supra medium latissimum  $4\frac{1}{2}$  mm. latum 5-nervium margine valde reflexum convexum, lateralia cum postico aequilonga vix latiora 5 mm. longa  $\pm$  obliqua 6-nervia margine valde reflexa. Petala oblanceolata 2 cm. longa 6 mm. lata apice acuta basi gradatim angustata basi 2 mm. lata margine valde exteriori recurva erecta 6-nervia  $\pm$  obliqua. Labellum



Fig. 37, *Cymbidium aloifolium* SWARTZ.  $\times 1$ ; photographed by Mr. T. SÖMA.

crassiusculum ad marginem tenue late oblongum 16 mm. longum 12 mm. latum apice truncatum ad centrum breve triangulare apiculatum, apiculis  $\frac{1}{2}$  mm. latis  $\frac{1}{4}$  mm. longis, vel retusum basi contractum facie supra brevissime villosum subtus glabrum, hypochilo erecto basi  $\pm$  saccato medio discis 4 tuberculato-elevatis  $\diamond$ -formiter dispositis, epichilo desuper recurvo patenti, lobis lateralibus (hypochili) lineari-oblongis  $4\frac{1}{2}$  mm. longis apice acutis, lobo

terminali (epichilo) oblongo 8 mm. longo 7 mm. lato apice truncato apiculato vel retuso basi haud contracto 8-nervio. Columna 13 mm. longa semiteres sensim alata subrecurva basi ad pedem brevissimum 2-lobatum producta.

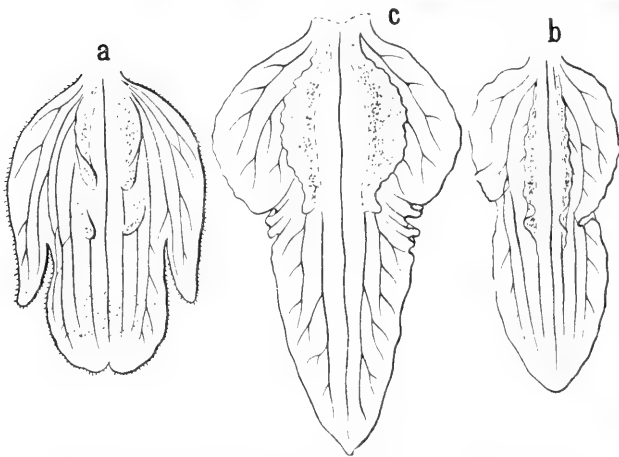


Fig. 38, a, *Cymbidium aloifolium* SWARTZ.; b, *Cymbidium misericors* HAYATA; c, *Cymbidium oreophilum* HAYATA; a, b and c,  $\times 3$ .

***Cymbidium arrogans* HAYATA sp. nov.** Folia lineari-lanceolata 30-40 cm. longa 13 mm. lata apice acuminata basi attenuata supra minute venulosa subtus prominente 3-nervia inter nervos minute venulosa. Scapi (racemi) 30 cm. longi erecti, parte non florifera 18 cm. longa vaginata, parte florifera 10-12 cm. longa, bracteis ovato-lanceolatis 1 cm. longis 2 mm. latis apice acutis, pedicellis cum ovario  $1\frac{1}{2}$  cm. longis. Flores apertientes  $3\frac{1}{2}$  cm. in diametro. Sepalum posticum oblongum 38 mm. longum 8 mm. latum apice obtuso-acutum basi  $\pm$  contractum 5-nerviium margine integrum planum, lateralia oblonga  $2\frac{1}{2}$  cm. longa 8 mm. lata apice obtusa basi haud contracta desuper leviter  $\hookleftarrow$ -formiter falcata. Petala oblonga sepalo breviora 2 cm. longa 8 mm. lata



apice acuto-obtusâ basi cuneato-contracta 5-nervia. Labellum ovato-oblongum 18 mm. longum 1 cm. latum facie brevissime hirsutum inter hypochilum et epichilum constrictum ad constrictionem 7 mm. latum, hypochilo subrotundato 1 cm. in diametro basi cuneato-contracto 9-nervio erecto medio discis 2-lamellatis instructo, lamellis ( )-formiter dispositis apice acutis, epichilo late ovato-rotundato 8-9 mm. lato 8 mm. longo apice rotundato-obtuso ad summum breve apiculato facie brevissime hirtellato 5-nervio patenti desuper recurvo. Columna complanata semi-teres 12 mm. longa.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near *C. ensifolium* Sw. (Bot. Mag. t. 1751; Sômokudusetsu, Vol. VIII. tt. 1 et 2); but differs by the falcate semi-oblong lateral sepals.

**Cymbidium formosanum** HAYATA Mater. Fl. Formos. p. 335. Folia ad apicem pseudobulbi 4-5 fasciculata, fasciculo singulo basi vaginis 4 apice ovato-lanceolatis acuminatis subplicatis nervosis 6-14 cm. longis involucreto, lamina linearia lanceolata 40 cm. longa 6-7 mm. lata apice acuminata basi gradatim attenuata in exsiccatō coriaceo-membranacea, nervis principalibus 3 supra prominente elevatis, inter nervos multivenata. Scapi 1-florati 6-10 cm. longi basi multi-vaginati, vaginis prope medium scapi 7 cm. longis a basi usque ad medium cylindraceis a medio usque ad apicem lanceolatis apice acuminatis scapem basi complete sursum fere amplexantibus glabris, vaginis superrimis cum flore subæquilongis. Flores solitarii apertientes 6 cm. in diametro, petalis sepalisque patentissimis, suberecti vel submutantes, pedicellis cum ovariis 2-3 cm. longis gracilibus. Flores ut videntur in exsiccatō fusco-atro-purpurascens. Sepalum posticum oblanceolatum 38 mm. longum 9 mm. latum apice acuto-acuminatum basi angustato-cuneatum basi 3 mm. latum 5-nervium planum, lateralia cum postico æquiformia ± longiora 4 cm. longa 1 cm. lata apice acuminata basi angustata basi 5 mm. lata margine leviter exteriore recurva 7-nervia. Petala oblonga oblongo-elliptica  $2\frac{1}{2}$  cm. longa circ. 1 cm. lata apice obtusissima vel obtusa basi 5 mm. lata 5-nervia plana. Labellum ampulliforme inferiore late rotundatum superiore oblongum, partibus late rotundatis (hypochilis) crassiusculis 12 mm. latis 9 mm. longis V-formiter versus longitudinem subplicatis medio discis 2-lamellatis instructis, lamellis ( )-formiter dispositis recurvis crassiusculis 1 mm. latis, partibus

superioribus (epichilis) oblongis 9 mm. longis apice rotundatis desuper reflexis liguliformibus margine subintegris. Columna elongata  $1\frac{1}{2}$  cm. longa 4 mm. lata antice subalata, alis  $\frac{1}{2}$  mm. latis. Capsula clavato-cylindrica 6-7 cm. longa 22 mm. lata 6-costata, costis 3 mm. latis, partibus inter costas 7 mm. latis, apice obtusissima basi attenuata rostrata ad stipitem gradatim abeuns, pedunculis 22 cm. longis.

HAB. Montibus centralibus, leg. U. MORI, Nov. 1906, (fl. et fr.).

Near *C. virens* LINDL., but differs from it by the much longer and acuter sepals. Also near *Cymbidium Mackinnoni* DUTHIE, Ann. Roy. Bot. Gard. Calc. IX. t. 115, but quite distinguishable from it by the obovoid cylindrical and nearly clavate capsules, and by the much narrower sepals.

**Cymbidium illiberale** HAYATA sp. nov. Folia lineari-lanceolata 40 cm. longa 1 cm. lata apice acuminata basi attenuata utraque minute venulosa subtus distincte supra haud nervata valde coriacea. Scapi vel racemi 20 cm. longi erecti basi vaginato-squamati, parte non florifera 10 cm. longa, parte florifera 10 cm. longa, bracteis lanceolatis minutis 5 mm. longis acutis, pedicellis cum ovariis 18 mm. longis, floribus a se 1-3 cm. remotis. Sepalum posticum lineari-lanceolatum 18 mm. longum  $3\frac{1}{2}$  mm. latum apice triangulari-obtusum basi haud contractum 2 mm. latum planum manifeste 3-nervium vel obscure 5-nervium, lateralia quam postico breviora et latiora  $1\frac{1}{2}$  cm. longa  $4\frac{1}{2}$  mm. lata apice obtusa basi haud contracta 3 mm. lata lineari-oblonga plana distincte 7-nervia haud obliqua. Petala oblique lineari-oblonga  $1\frac{1}{2}$  cm. longa  $4\frac{1}{2}$  mm. lata apice obtusa basi angustiora  $1\frac{1}{2}$  mm. lata plana 7-nervia leviter  $\hookleftarrow$ -formiter recurva. Labellum late obovatum facie brevissime hirsutum 13 mm. longum 11 mm. latum apice rotundatum vel ad summum breve triangulari-cuneatum, hypochilo erecto medio discis 2-costatis instructo, costis 8 mm. longis paralleliter dispositis, lobis lateralibus (hypochili) semi-oblongis apice rotundatis a basi labelli usque ad apicem 1 cm. longis 5 mm. latis erectis, lobo terminali (epichilo) desuper recurvo rotundato 6 mm. in diametro. Columna 13 mm. longa complanato-semiteres recurva intus brevissime hirsuta sursum alata, alis 1 mm. latis. Petala sepalaque viridescencia  $\pm$  rubescentia. Labelli disci flavescentes; labelli lobi laterales rubro-punctati, lobo terminali

rubro-maculato. Labellum subtus leviter rubescens basi atro-rubrum. Columna basi atro-sanguinea.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, Mart., 1914, leg. B. HAYATA, (fl.).

Near *Cymbidium pumilum* ROLFE (in Kew Bullet. 1907, p. 130; *Kiryō-ken*, Sōmokuzusetsu, XVIII. t. 13.); but differs from it by the light reddish green petals and sepals and by the lips which are light red with a red maculation on the front lobe, and numerous minute red spots on the side lobes.

**Cymbidium lancifolium** HOOK. f.; Orchid. Sikkim Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 247.

HAB. Formosa: loco non indicato; cult. in bot. horto. Tōkyō, leg. B. HAYATA.

The orchid has been cultivated in our garden since some years, and is believed to have come from Formosa. The flowers are slightly different from the figure given in the above referred work.

**Cymbidium misericors** HAYATA sp. nov. (Fig. 38-b). Pseudobulbi vix prominentes. Fasciculus folii 4-5-foliatus. Folia lanceolata 30-40 cm. longa 11 mm. lata apice acuta vel obtusa basi attenuata basi in parte angustissima 5 mm. lata infra basin dilatata 1½ cm. lata pseudobulbos semi-amplectantia margine integra prope apicem sub lente denticulata in vivo tenuiter coriacea, nervis principalibus 3, inter nervos multivenulata, nervis venisque supra minus subtus plus prominentibus. Racemi (scapi) 15-20 cm. longi laxi florati, floribus a se 3-4 cm. remotis, bracteis lanceolatis circ. 1 cm. longis acuminatis, pedicellis cum ovariis 2½-3 cm. longis. Flores apertientes 4 cm. in diametro viridi-albescentes haud maculati fragrantis, inter menses Septembris et Octobris apertientes. Sepalum posticum oblongo-oblanco-latum 27 mm. longum 9 mm. latum supra medium latissimum apice acutum vel obtusum ad summum apiculatum basi ± angustius ad insertionem haud contractum 3 mm. longum subplanum vel margine tenuissime exteriore recurvum distincte 5-nerviū crassiusculum margine integrum, lateralia cum postico aequilonga sed angustiora oblanco-lata 6 mm. lata apice obtusa ad summum apiculata basi cuneato-angustata ad basin 3 mm. lata 5-nervia. Petala oblonga 24 mm. longa 1 cm. lata vel obovato-oblonga apice obtusa sed ad summum acuta basi obtuso-

contracta 2 mm. lata plana distincte 7-nervia. Labellum obovato-oblongum 21 mm. longum 12 mm. latum apice late obtusum basi rotundato-contractum, hypochilo 8 mm. longo 9 mm. lato valde concavo medio discis 2-lamellatis crassis instructo, epichilo rotundato 12 mm. longo desuper reflexo convexo 7-nervio, crassiusculum facie minute sub lente tuberculatum margine sub lente minute denticulatum. Columna 12 mm. longa leviter recurva semiteres  $\curvearrowright$ -formis in sectione apoda.

HAB. Mt. Kwannonzan, prope Tamsui; cult. in seminario Taihoku, leg. B. HAYATA et T. SŌMA, Mart. 1914.

Near *C. kanran* MK. (in Sŏmokudsusetsu XVIII. t. 6), but differs from it by the greenish flowers with non-dotted lips.

**Cymbidium oreophilum** HAYATA n. sp. (Fig. 38-c). Folia et habitus ut speciei precedentis (*Cymbidii misericordis*). Racemi (scapi) circ. 50 cm. longi, partibus non floriferis 30 cm. longis basi squamatis, squamis subvaginiformibus 4-5 cm. longis inferiore cylindraceis superiore lanceolatis apice acuminatis nervosis, floribus a se 5 cm. remotis, bracteis lanceolatis 2 cm. longis acuminatis, pedicellis cum ovariis  $3\frac{1}{2}$  cm. longis. Flores apertientes fragrantis 7 cm. in diametro viridescentes, sepalis petalisque retrorse reflexis; labellum flavescens rubro-maculatum. Sepalum posticum lineari-lanceolatum  $4\frac{1}{2}$  cm. longum 4 mm. latum apice acuminatissimum basi haud contractum sed leviter angustius 5-nerviū margine exteriori recurvum valde retrorse reflexum, lateralia cum postico conformia sed  $\pm$  obliqua. Petala ovato-lanceolata 3 cm. longa 7-8 mm. lata apice acuminata basi contracta ad insertionem 2 mm. lata 5-nervia margine integra subplana. Labellum oblengo-ovatum 25 mm. longum 15 mm. latum apice obtusum apice triangulari-acutum tenuiter inferiore recurvum basi rotundatum contractum ad insertionem 3 mm. latum, hypochilo late rotundato 14 mm. lato 12 mm. longo medio discis 2-lamellatis instructo, (lamellis  $\curvearrowright$ -formiter dispositis crassis 1 mm. latis recurvis sublaevibus), concavo crassiusculo margine tenuissimo erecto, epichilo elongato-triangulari ovato  $1\frac{1}{2}$  cm. longo 1 cm. lato crassiusculo margine tenuissimo undulato-integro valde desuper recurvo. Labellum subtus laeve supra toto minute tuberculatum margine sub lente minute denticulatum. Columna semiteres 13 mm. longa  $\curvearrowright$ -formis in sectione subalata.

*Cymbidium misericors* HAYATA var. *oreophilum* HAYATA in sched. herb. Taihoku.

HAB. Formosa: loco non indicato; cult. in seminario Taihoku, leg. B. HAYATA, Mart. 1914.

The present orchid was regarded as a variety of the preceding species. After careful examination, I have found that the sepals and petals of this new plant are considerably larger than those of the preceding species, and the lips of the former are minutely botryoideo-tuberculate all over the upper surface, while those of the latter are hirsute. All these collectively make it sufficient to regard this new plant as specifically different from the preceding species.

**Cymbidium purpureo-hiemale** HAYATA sp. nov. Folia angustissima linearia 40 cm. longa 5-6 mm. lata apice acuminata basi angustissime attenuatoplicata supra minute venulosa subtus 3-nervia, nervis prominentibus, inter nervos minute venulosa tenuiter coriacea. Scapi vel racemi 25-30 cm. longi, parte florifera 15 cm. longa laxe florata, floribus 3-4 cm. a se remotis, bracteis subnullis (vel caducissimis?) 1 mm. latis annuliformibus  $\frac{1}{10}$  mm. longis, pedicellis cum ovariis 1½ cm. longis. Flores apertientes 6½ cm. in diametro. Sepalum posticum lineari-lanceolatum 4 cm. longum 4 mm. latum apice acuminatum basi haud contractum 5-nerviū margine interiore recurvum, lateralia quam postico vix breviora vix latiora 3½ cm. longa 4 mm. lata sursum margine interiore recurva. Petala ovato-lanceolata 2½ cm. longa 6 mm. lata apice acuta basi contracta 1½ mm. lata ± concava margine plana 7-nervia. Labellum brevissime hirtellum in circumscriptione ovatum 22 mm. longum 12 mm. latum, hypochilo erecto late rotundato 12 mm. lato 9 mm. longo margine integro (lobis lateralibus erectis) medio discis 2-lamellatis instructo, lunellis circ.  $\frac{1}{2}$ -1 mm. latis ( )-formiter dispositis, epichilo desuper recurvo oblongo 12-13 mm. longo 7 mm. lato apice triangulari-obtusissimo ad apicem vel prope apicem margine interiore recurvo margine subintegro basi non contracto basi secus nervos manifeste hirtello, inter hypochilum et epichilum constrictum 6 mm. latum. Columna 12 mm. longa tenuiter recurva complanato-semi-teres sursum subulata.

HAB. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. HAYATA, 1914, Mart.

Near *Cymbidium kanran* MAK. in Sōmoku-zusetsu Vol. XVIII. tt. 4, 5

et 6, but differs from it by the lips with hirsute lines on the terminal lobes.

**Cymbidium simon-**  
**sianum** KING et PANTLING

(Fig. 39). Orch. Sikk.

Himal. in Ann. Roy. Bot.

Gard. VIII. t. 250. HAB.

Mt. Arisan. Observ. Folia

40-50 cm. longa linearia 9 mm. lata apice acumi-

nata basi attenuata in ex-

siccato valde coriacea

utraq. pagine laud

distincte nervata sed

minute elevato-venulosa

basi cum petiolis articu-

lata, petiolis 6 cm. longis

late sulcatis semicirculari-

bus in sectione in

explicato 6 mm. longis basi

dilatatis, partibus dilatatis

ovatis 1 cm. longis toti-

usque latis semiamplexi-

caulibus. Scapi vel racemi

45 cm. longi basi vaginato-

squamati, squamis 6-7

cm. longis acuminatis lan-

ceolatis, bracteis triangu-

lari-lanceolatis 5 mm. long-

is, floribus apertientibus

4½ cm. in diametro. Sepa-

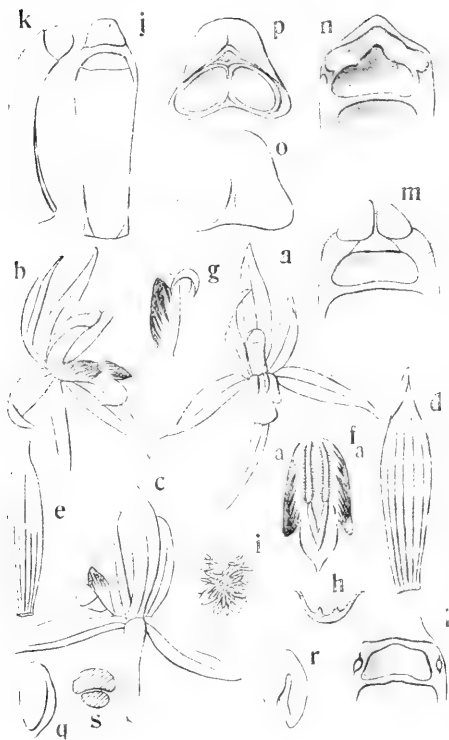


Fig. 39, *Cymbidium Simonsianum* K. et P.; a, b, c, a flower, seen from different sides; d, a sepal; e, a petal; f, a lip; g, the same, seen from side; h, the same, in section of a portion shown by a-a in fig. f; i, a portion of the disc; j, a column; k, the same, seen from side; l, apical portion of the same; m, the same, operculum taken off; n, the same, pollinarium taken off; o, an operculum, seen from front; p, the same, seen from back; q, a pollinium; r, the same, seen from side; s, the same in section; fig. a-c, natural size; others more or less magnified.

lum posticum oblanceolatum  $2\frac{1}{2}$  cm. longum  $6\frac{1}{2}$  mm. latum apice acuminatum basi non contractum 4 mm. latum prope apicem margine interiore recurvum 7-nervium, lateralia cum postico conformia plus minus obliqua. Petala oblongo-lanceolata 2 cm. longa  $5\frac{1}{2}$  mm. lata apice acuto-acuminata basi vix contracta  $1\frac{1}{2}$  mm. lata 7-nervia margine integra plana. Labellum in circumscriptione ovatum 16 mm. longum 11 mm. latum apice cuspidato-acuminatum basi cuneato-rotundatum ad basin contractum  $1\frac{1}{2}$  mm. latum facie glabrum basi in hypochilo erecto medio discis 2-carinatis instructum, carinis 6 mm. longis  $\frac{1}{2}$  mm. latis elevatis hirtellis paralleliter ||-formiter dispositis, 3-lobum, lobis laterilibus (hypochili) oblongis  $2\frac{1}{2}$  mm. latis a basi lobi terminalis ad apicem lobi lateralis  $3\frac{1}{2}$  mm. longis apice obtusis, sinibus inter lobos laterales et lobum terminalem obtusis, lobo terminali (epichilo) desuper recurvo ovato 9 mm. longo 6 mm. lato apice cuspidato-acuminato basi rotundato-contracto ad basin 5 mm. lato. Columna 1 cm. longa complanato-semiteres 4 mm. lata glaberrima subulata, alis sursum  $\frac{1}{2}$  mm. latis.

**Cymbidium sinense** WILLD.; Sōmokudsusetsu XVIII. t. 11.

HAB. Heichōshō, leg. S. NAGASAWA, fl. 1904, (No. 340).

OBSERV. Folia lanceolata 50 cm. longa  $2\frac{1}{2}$  cm. lata apice acuminata basi attenuata supra utroque latere costae prominente 2-nervata inter nervos minute venulosa, costa supra non distincta non elevata, subtus cum costa prominente 3-nervata, inter nervos minute venulosa. Scapi vel racemi 60-70 cm. longi, parte non florifera 40 cm. longa vaginato-squamata, squamis cylindrico-lanceolatis acuminatis 7-8 cm. longis, parte florifera 20 cm. longa laxè florata, floribus a se 3-4 cm. remotis, bracteis lanceolatis acuminatis 12 mm. longis glabris, pedicellis cum ovariis 2 cm. longis. Flores apertientes 5-6 cm. in diametro. Sepalum posticum lineari-lanceolatum  $3\frac{1}{2}$  cm. longum  $\frac{1}{2}$  cm. latum, apice acuminatum basi vix contractum 2 mm. latum margine  $\pm$  exteriore recurvum 7-nervium, lateralia cum postico conformia. Petala ovato-lanceolata 26 mm. longa 8 mm. lata apice obtusa ad summum acuta basi obtuso-contracta 2 mm. lata 7-nervia plana. Labellum tenuissime hirtellum in circumscriptione ovatum 17 mm. longum 10 mm. latum obtusissimum basi rotundato-cuneato-contractum  $1\frac{1}{2}$  mm. latum, hypochilo late rotundato 9 mm. longo 1 cm. lato medio discis 2-lamellatis instructo, (lamellis sursum latiusculis versus apicem se convergentibus

(-)formiter dispositis), erecto margine latere erecto, epichilo oblongo 11 mm. longo 7 mm. lato apice obtuso basi vix vel haud contracto secus nervos subtuberculato transverse maculato. Columna 13 mm. longa  $\pm$  recurva complanato-semiteres alata.

*Cremastra* LINDL.

***Cremastra triloba* HAYATA** (Fig. 40) Ic. Pl. Formos. II. p. 135. Herba terrestris, rhizomate erecto tuberoso ovoideo-globoso  $1\frac{1}{2}$  cm. longo basi totiusque

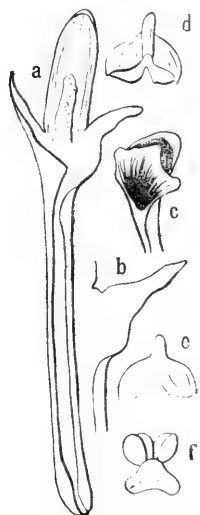


Fig. 40, *Cremastra triloba* HAYATA; a, a lip; b, lateral lobe of the same; c, apical portion of the column; d, an anther, seen from back; e, the same, seen from front; f, pollinarium.

lato apice acuto basi latissimo 2-3 nodoso ad nodos vaginato, (vaginis defectis), ad apicem folium unum gerenti, ad nodos juxta apicem scapum unum gerenti. Folia solitaria longe petiolata basi petioli 1 (vel 2?) vaginis instructa, (vaginis petiolum in longitudine superantibus apice plus minus dilatatis obtusis), petiolis 10-12 cm. longis dimidium laminæ in longitudine æquantibus subteretibus tubulosis, laminis cum petiolum articulatis elliptico-lanceolatis 30 cm. longis. 5 cm. latis apice acutis basi attenuatis lineari-bus, (partibus linearibus 6-7 cm. longis 3 mm. latis plicatis, petiolis articulato-continuis) membranaceis, venis elevatis subplicatis. Scapi solitarii 30-40 cm. alta teretes 5 mm. in sectionis diametro basi 2-nodosi, internodiis inferioribus 4 cm. longis, superioribus 10 cm. longis ad nodos vaginatis, (vaginis tubulosis 5-6 cm. longis apice acutis vel obtusis,) partibus florigeris 10-15 cm. longis racemosis. Flores ascendo-patentes vel erecto-patentes plus minus secundi 3 cm. longi, segmentis conniventibus apice vix patentibus, pedicellis (cum ovariis) 13 mm. longis, bracteis lanceolatis 8 mm. longis. Sepala subæqualia conniventia lineari-oblancoolata apice acuta basi attenuata,

posticum 33 mm. longum 4 mm. latum basi non contractum, lateralia plus minus obliqua. Petala angustiora lineari-oblancoolata breviora quam sepalis 30 mm. longa 3 mm. lata apice acuta basi attenuata. Labellum lineare



sepalum posticum in longitudine æquans 33 mm. longum versus apicem 3-lobatum, (lobo medio oblongo 8 mm. longo  $3\frac{1}{4}$  mm. lato apice obtuso vel rotundato basi non contracto, lobis lateralibus angulo  $45^\circ$  divaricatis lanceolato-triangularibus basi latere inferiore auriculatis plicatis 4 mm. longis apice obtusis vel acutis), basi lobi medii 1-appendiculatum, appendiculis liguliformibus liberis crassiusculis minute tuberculatis, margine a lobis lateralibus usque ad basin labelli plicato-inflexum basi leviter ventricosum. Columna linearis 23 mm. longa labello brevior exalata apice dilatata, partibus dilatatis obtriangularibus 3-4 mm. latis; rostellum latissimum. Pollinia 4.

HAB. Mt. Nashitanzan, Mt. Rontabunzan, Jiögesha, leg. U. MORI, Aprili., 1910.

Near a small form of *C. Wallichii*, but differs distinctly by the labellum, the lobes of which are much more divaricate. In the Indian species, the side lobes of the lips are nearly parallel to the middle lobe.

#### *Luisia* GAUD.

**Luisia megasepala** HAYATA sp. nov. (Fig. 41). Epiphyta. Caulis teres viridis 20-30 cm. longus ramosus cum vaginis foliorum 4 mm. in diametro tota longitudine foliosus vaginis foliorum toto obtectus. Folia alternata se 2 cm. remota; vagina foliorum cylindrica 2 cm. longa 4 mm. in diametro ore subtruncata vel leviter obliqua, lamina foliorum  $\pm$  lateraliter compressa tereto-lineari circ. 10 cm. longa 2 mm. in diametro apice obtusa basi oblique cum vaginis articulata. Racemi 2-3-florati latere caulis per vaginam oriundi brevissimi, rhachibus 1 cm. longis bracteis phuri-seriatis perfecte obtectis, bracteis distiche imbricateque dispositis latissime triangularibus, superioribus majoribus 3 mm. longis 6 mm. latis, pedicellis 1 cm. longis, floribus subcernuis. Sepala leviter viridia dorso purpureo-punctata, petalis flavo-viridibus, labello supra atro-purpureo subtus medio viridi, partibus lateralibus labelli purpureis. Sepalum posticum oblongum 13 mm. longum 7-8 mm. latum 6-nervium apice rotundatum basi 6 mm. latum; sepala lateralia oblonga 13 mm. longa 7-8 mm. lata apice dorso carinata leviter cornuta 5-nervia. Petala obovato-oblonga sepalo longiora 16 mm. longa 7 mm. lata apice obtuso-rotundata deorsum  $\pm$  angustiora basi 3 mm. lata. Labellum obovato-cuneiforme 16 mm. longum 9 mm. latum sessile basi latere lobis basilaribus instructum, lobis basilaribus triangulari-

bus 3 mm. longis 2 mm. latis erectis apice sub-acutis, basi medio supra saccatim

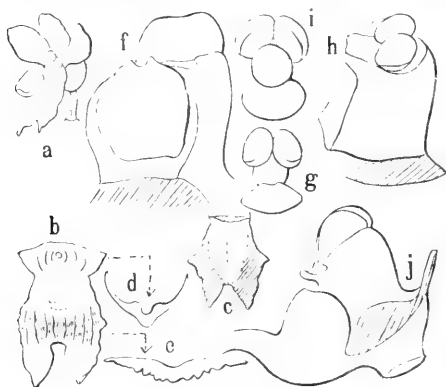


Fig. 41, *Luisia megasepala* HAYATA; a, a flower; b, a lip, seen from above; c, the same, seen from below, shading shows purple colored parts; d, section of the part shown by a chain-line; e, section of another parts shown by another chain-line; f, a column; g, the same, seen from side; h, the same, anther taken off; i and j, pollinarium, seen from different sides; a, natural size, others more or less magnified.

impressum supra partem basilarem constrictum  $4\frac{1}{2}$  mm. latum sursum dilatatum supra medium 9 mm. latum apice 2-lobatum, (lobis triangulari-oblongis 3 mm. longis totiusque latis apice obtusis), margine medio lobulatum sursum et deorsum integrum crassiusculum, supra reticulato-sulcato impressum subtus laeve, utraque pagine sub microscopio minute muricato - punctatum. Columna brevissima 4 mm. longa.

HAB. Formosa: cult. in seminario Taihoku, leg. B. HAYATA, Aprili, 1914.

Near *L. teres* BL. and *L. linkiuensis* SCHLECHT.; but differs from them by the broader petals and sepals, and triangular basal lobes of the lip.

### *Diploprora* Hook. f.

***Diploprora kusukusensis* HAYATA sp. nov.** (Fig. 42). Epiphyta. Caulis subteres 5-10 cm. longus vaginis foliorum obtectus. Folia alterna oblongo-lanceolata 8 cm. longa 2 cm. lata apice acuta ad summum brevissime 2-loba basi obtusa cum vaginis articulata subdistichum disposita margine integra  $\cup$ -formiter falcata crassiuscula subconcolora, venis lateralibus parallelis in exsiccato elevatis. Racemi 5 cm. longi paucè floriferi, floribus 3-5, pedicellis divaricatis 5 mm. longis, bracteis late triangularibus 3 mm. longis medio plicatis rhachin amplexantibus. Flores subalbi vel leviter flavescenti-albi patentes 15 mm. in diametro. Sepalum posticum obovato-

oblongum 9 mm. longum 4 mm. latum 7-nervium apice rotundatum basi plus minus angustius  $2\frac{1}{2}$  mm. latum dorso medio carinatum, lateralibus postico subaequiformia. Petala oblique oblongo-oblancheolata 8 mm. longa 3 mm. lata apice obtusa 5-nervia. Labellum latissime naviculiforme apice lineari-caudatum ad summum bisetosum basi latissimum 4 mm. latum sursum subito contractum ad caudam linearem 3 mm. longam productum, (cauda lineari deorsum laterale compressa sursum dorso compressa ad summum setis 2 instructa, setis 2 mm. longis subcrispis filiformibus), medio intus callo uno instructum, callo obtriangulati 3 mm. longo apice 2 mm. lato. Columna 2 mm. longa.

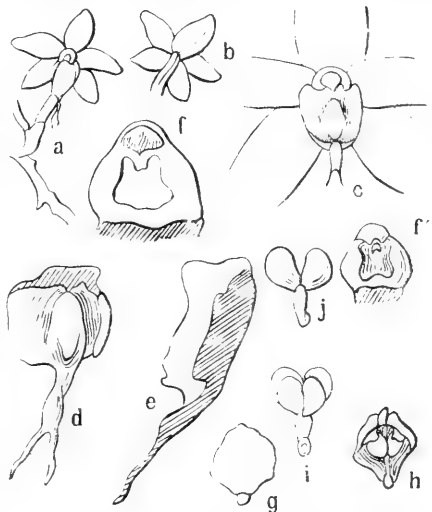


Fig. 42, *Diploprora kusukusensis* HAYATA; a, part of inflorescence and a flower; b, the same flower, seen from back; c, central part of the same flower; d, a lip, with transverse section; e, the same lip with vertical medial section; f, stigma, rostellum ad clinandrium; g, an anther; h, the same, seen from back; i, pollinarium; j, the same seen from back.

HAB. Kusukusu, Juni., 1912, leg. B. HAYATA et S. SASAKI.

Very near *D. Championi*, but differs by the longer threads at the apex of the labellum and by the other points.

***Diploprora uraiensis* HAYATA sp. nov.** (Fig. 43). Epiphyta subpendula? Caulis 18 cm. longus toto foliosus vaginis foliorum obteectus. Folia crassiuscula oblongolanceolata vel lineari-lanceolata 11 cm. longa 2 cm. lata —formiter falcata apice inaequaliter breviter bi-lobata, lobis 1 mm. longis acutis, basi contracta cum vaginis articulata in exsiccatō venis lateralibus parallelis elevatis, utraque pagine sub-concolora subdistichum disposita  $1\frac{1}{2}$  cm. a se remota, vaginis circ.

2 cm. longis ore truncatis. Racemi laterales 7 cm. longi paucè florati, floribus 4-5 remote dispositis, pedicellis 5 mm. longis patentibus, bracteis lanceolatis. Flores patentes  $1\frac{1}{2}$  cm. in diametro. Sepala et petala flava; columna alba;

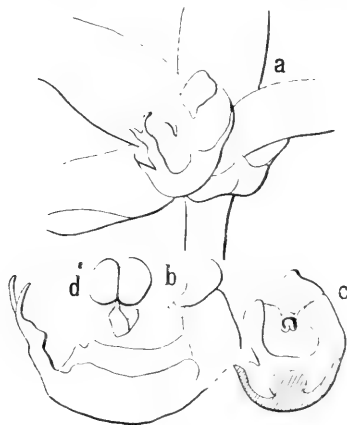


Fig. 43, *Diploprora uraiensis* HAYATA; a, central portion of a flower; b, the same seen from side sepals and petals taken off; c, a column with basal portion of a lip, seen from front; d, a pollinarium.

labellum album intus maculatum, maculis flavescentibus. Sepalum posticum oblongo-oblanccolatum 8 mm. longum  $3\frac{1}{2}$  mm. latum apice obtuso-rotundatum basi angustatum  $1\frac{1}{2}$  mm. latum dorso medio carinatum, lateralia postico latiora. Petala oblique lineari-oblonga 8 mm. longa 3 mm. lata apice obtusa 5-nervia. Labellum latissime naviculi-forme apice lineari-caudatum ad summum setis 2 instructum cum cauda, setaque 8 mm. longum parte basilari latissima, 4 mm. lata 3 mm. longa quadrangulati intus callosa, (callo obtriangulati-oblongo basi acuto 3 mm. longo  $1\frac{1}{2}$  mm. lato), apice subito contracta ad caudam abeunti, cauda lineari  $2\frac{1}{2}$  mm. longa setis filiformibus

subcrispis  $1\frac{1}{2}$  mm. longis duabus instructa. Columna  $2\frac{1}{2}$  mm. longa. Capsula cylindrica utrinque acuta 4 cm. longa 1 cm. lata.

HAB. Uraisha, 1914.

Near *D. kusukusensis* HAYATA, but differs from it by the smaller yellow flowers and larger leaves.

#### *Saccolabium* BLUME.

***Saccolabium formosanum* HAYATA** (Fig. 44) Mater. Fl. Formos. p. 336. Herba epiphytica, caulibus foliatis non pseudo-bulbosis prostratis vaginis foliorum persistentibus instructis ad nodos radicanibus. Folia disticha carnosa plana oblonga 2 cm. longa 7 mm. lata apice obtusa breve apiculata basi in petiolum 2 mm. longum cum vaginis articulatum deciduum

contracta, vaginis 5 mm. longis persistentibus caulem obtegentibus. Racemi laterales breves 3 cm. longi pauciflorati, bracteis minutis scariosis, pedicellis 1 cm. longis, floribus mediocribus 13 mm. in diametro. Sepala aequalia libera patentia oblonga 5 mm. longa 3 mm. lata apice utrinque obtusa concava. Petala patentia sepalo subsimilia apice rotundata margine exteriori recurvata. Labellum ad basin columnae sessile basi saccatum, saccis majusculis 6 mm. longis totiusque latis, ore contracto 4 mm. in diametro, lamina patenti latissima 4 mm. longa 1 cm. lata apice truncata latere divaricata obtusa. Discus ad medium laminae incrassatus hirsutus. Columna brevis 1½ mm. longa 3 mm. lata; rostellum 3-dentatum, dentibus desuper recurvis.

HAB. Arisan, in monte Morrison, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3164).

Somewhat near *S. japonicum* but differs from it in having flowers with longer peduncles. There is none like this at Kew.

**Saccolabium fuscopunctatum** HAYATA (Fig. 45) Ic. Pl. Formos. II. p. 143. Epiphyta, caulibus prostratis ad nodos radicantibus foliosis. Folia disticha alterna crassa angulo 90° a caule divaricata angustata vel angustato-oblonga 2 cm. longa vel longiora 4-5 mm. lata desuper arcuata apice acuta basi rotundata subsessilia supra 1-suleata subtus plus minus convexa supra fusco-purpureo-punctata subtus fusco-purpureo-maculato-punctata, vaginis imbricatis cylindraceis 5 mm. longis ore obliquis basi angustis maculato-punctatis. Racemi breves pauciflorati, floribus 1-2. Flores flavescentes rubro-purpureo-

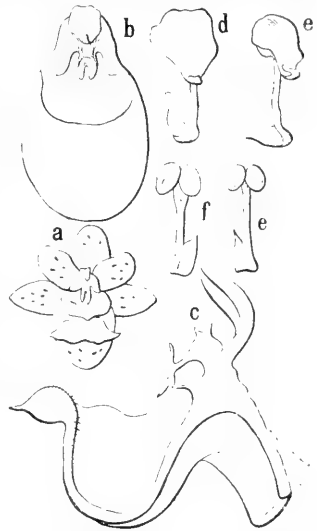


FIG. 44, *Saccolabium formosum* HAYATA; a, a flower; b, a lip and column, lamina taken off; c, a lip, column and a dorsal sepal, medially cut; d, pollinarium in an anther, seen from front; e, pollinarium, seen from back; f, the same, seen from back.

punctati 9 mm. in longo diametro, pedicells 1 cm. longis, bracteis oblongo-triangularibus obtusis. Sepala patentia reflexa, posticum ellipticum 4 mm. longum  $2\frac{1}{2}$  mm. latum apice rotundatum basi truncatum non contractum, lateralibus cum postico aequalibus. Petala sepalis subaequalia. Labellum basi ad columnam adnatum plus minus cum alis columnae continuum saccatum, saceo 5 mm. longo punctato-maculato ore contracto, lamina rotundata 2 mm. in diametro apice brevissime 2-lobata valde concava, disco ad medium laminae sito incrassato hirsuto. Columna brevis 1 mm. longa 3 mm. lata, rostellum 2-dentatum.



Fig. 45, *Saccolabium fuscopunctatum* HAYATA; a, a flower bud, seen from side; b, an opened flower, seen from front; c, sepals and petals, explicated; d, lip and columna; e, the same, medially cut; f, apical portion of a columna, rostellum and anther are seen; g, the same, anther taken off, to show clinandrium; h, operculum, seen from back.

HAB. ARISAN, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *S. formosanum*, but differs by the maculated leaves and the much smaller rounded lobes of the labellum. Also near *S. Matsuran* MAK. from which this differs by the much larger flowers. It was brought back by myself from Arisan here to the Koishikawa

Garden, where it flowered in May, 1912, in a green house.

***Saccolabium quasipinifolium* HAYATA** (Fig. 46) Ic. Pl. FORMOS. II. p. 144. Epiphyta 4-5 cm. alta, radicibus teretibus incrassatis albicantibus 2 mm. in sectione 20-30 cm. longis undulato-reflexis. Caules dense foliati 7-8 cm. longi, vaginis foliorum imbricatis. Folia 8-9 disticha alterna acerosa extrose leviter recurvata subteretia cum vaginis circ. 10 cm. longa intus (supra) profunde sulcata extus (subtus) rotundata in sectione apice obtusa vel acuta basi cum vaginis articulata extus basi plus minus costata, vaginis dilatatis eadem semi-amplexantibus fusco-purpurascensibus explicato 7 mm. latis glabris. Racemi axillares 1-2-3-florati folium in longitudine aequantes, pedunculis 5-6 cm. longis ad medium bracteis unis instructeis, bracteis (non

floriferis) vaginiformibus 5-6 mm. longis obtusis. Flores apertientes 2 cm. in longo diametro  $1\frac{1}{2}$  cm. in brevi diametro albo-viridescentes basi bracteis unis instructi, bracteis (floriferis) circ. 1 cm. longis florem amplectantibus obtusis, pedicellis (cum ovariis) 8 mm. longis 5-6-sulcatis. Sepalum posticum obovatum 9 mm. longum obtusum basi non contractum 3-nervium dorso carinato-costatum, lateralibus valde obliquis posticum in longitudine aequantibus acuto-obtusis latere inferiore latioribus dorso 4-carinato-costatis. Petala sepalis subaequalia sed plus minus breviora 3-nervia carinato-costata. Labellum horizontaliter patens 1 cm. longum 3-lobum 1-calcaratum, (calcarei 1-1 $\frac{1}{2}$  cm.

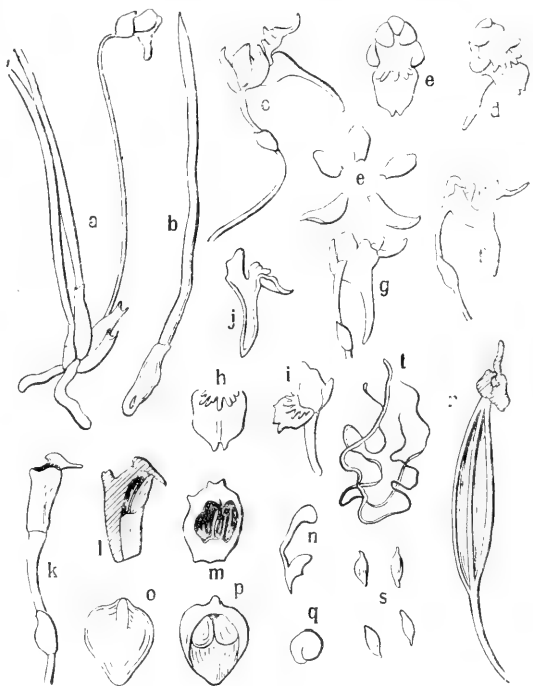


Fig. 46, *Saccolabium quasipinifolium* HAYATA; a, the plant; b, a leaf; c, d, a flower, seen from side; e, the same, seen from front; e, detached sepals and petals; f, a flower, sepals and petals taken off, seen from side; g, the same, seen from back; h, lamina of the lip; i, a detached lip; j, the same, medially cut; k, a column on the peduncle, anther taken off; l, the same, medially cut; m, the same, seen from front; n, a pollinarium, pollinia, caudicle and gland; o, an anther, seen from front; p, the same, seen from back; q, a pollinium; r, a fruit; s, seeds; t, threads in the capsule. a-j, and r, natural size; others variously magnified.

longo retrorsum recurvo apice obtuso ore dilatato), lobis lateralibus ad latus faucis calcaris erectis latiusculis oblique triangularibus 4-5 mm. altis basi 6 mm. latis apice obtusis, lobo medio valde convexo 8 mm. longo 6 mm. lato apice obtuso breve 2-apiculato minute denticulato multi-nervio; disco basi lobi centralis transverse sito plurilobulato, lobulis calloso-lamellatis, lamellis 1-2 mm. longis obtusis. Columna 6 mm. longa 3 mm. lata alata, rostellum antice acutum 2-lobum. Anthera rubescens 3 mm. longa  $2\frac{1}{2}$  mm. lata antice acuta postice medio 1-costata 1-locularis; pollinia 2 subglobosa sulcata, stipitibus lamellatis linearibus  $3\frac{1}{2}$  mm. longis circ.  $\frac{1}{2}$  mm. latis basi attenuatis. Capsula cylindrica apice breve basi longe attenuata 4 cm. longa 8 mm. lata multicostata. Semina minuta fusiformia cum fibris longissimis multis mixta.

HAB. Mt. Arisan, leg B. HAYATA et S. SASAKI, Jan., 1912.

**Saccolabium retrocallum** HAYATA sp. nov. (Fig. 47). Epiphyta.

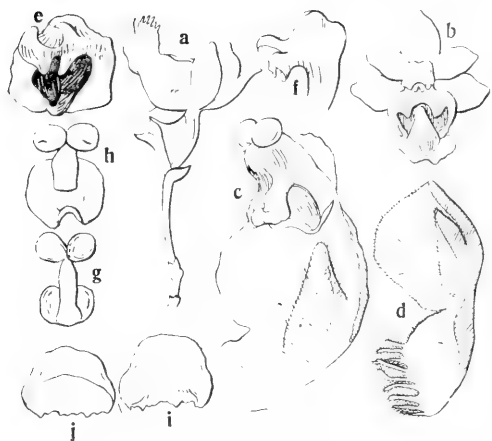


Fig. 47, *Saccolabium retrocallum* HAYATA; a, a flower on the inflorescence, purple colored portion is shaded; b, a flower, seen from front, purple colored parts are shaded; c, a columna and lip, the latter partially cut off; d, a lip, medially cut, showing a refracted callosity; e, columna, anther taken off, stigma and clinandrium are seen; f, the same, seen from side; g, a pollinarium, seen from front; h, the same, seen from back; i, an operculum, seen from front; j, the same, seen from back.

Caulis subteres in nostro specimine brevis  $1\frac{1}{2}$ -2 cm. longus foliatus, internodiis brevibus. Folia disticha elliptico-oblonga crasso-coriacea  $2\frac{1}{2}$  cm. longa 1 cm. lata apice obtusa basi contracta cum vaginis articulata 9-nervia margine leviter desuper recurva, vaginis persistentibus 3 mm. longis imbricatis caulem obtegentibus. Pedunculi laterales simplices folio aequilongi 2 cm. longi basi medio apiceque



bracteis instructi, bracteis infimis tubiformibus 2 mm. longis, eis superioribus late triangularibus  $1\frac{1}{2}$  mm. longis. Flores in nostro specimine solitarii apertientes  $1\frac{1}{2}$  cm. in diametro. Sepala patentia distincta albo-flavescentia 5-nervia, posticum ovato-oblongum 7 mm. longum  $3\frac{1}{2}$  mm. latum apice obtusum basi leviter cuneato-contractum ad basin  $1\frac{1}{2}$  mm. latum, lateralia angustiora quam postico  $\pm$  obliqua 8 mm. longa 3 mm. lata apice acuta basi cuneato-angusta. Petala sepalo breviora angustato-oblonga 7 mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi angustata. Labellum ad basin columnæ sessile patens in circumscriptione oblongum ecalcaratum sepalis longius 14 mm. longum 8 mm. latum concavum sursum medio valde crassum, callo uno triangulari retrorso instructum medio contractum, lobis lateralibus (vel auriculis) 2 mm. longis  $5\frac{1}{2}$  mm. latis margine minute ciliolatis, lobo terminali rotundato 7 mm. longo 8 mm. lato apice emarginato margine breve fimbriato. Labellum extus glabrum intus breve hirsutum intus prope callum ancori-forme purpureo-coloratum, (callo colorato), cæterum albicans. Columna brevis lata 1 mm. longa apoda exalata, clinandrium dentibus 2 instructum. Anthera terminalis opercularis incumbens, pollinia 2 globosa cerea vix sulcata; caudicula linearis  $2\frac{1}{2}$  mm. longa, glandula cordato-rotundata parva. Fructus ignoti.

HAB. Formosa: loco non indicato; cult. in seminario Taihoku, leg. B. HAYATA, Juni., 1912.

Remarkable for the large obtriangular retrorse callosities on the center of the lips.

**Saccolabium Somai** HAYATA sp. nov. Epiphyta; caulis 7-8 cm. longus. Folia altera distiche disposita lineari-oblongata 14 cm. longa 17 mm. lata apice mucronato-acuta ad summum obtusa basi attenuata crassiuscula in exsiccato chartaceo-membranacea  $\cup$ -formiter recurva cum vaginis articulata, vaginis 5 mm. longis apice truncatis cum foliis articulatis nervosis. Racemi laterales 2 cm. longi pauci-florati. Sepalum posticum lineari-obovatum 6 mm. longum 3 mm. latum apice obtusissimum basi angustius 1 mm. latum 3-nervium, lateralia obovata 6 mm. longa  $2\frac{1}{2}$  mm. lata 3-nervia apice obtusa basi cuneato-angustata. Petala sepalo subsimilia angustiora. Labellum sacciforme 7 mm. longum 5 mm. latum ore 3 mm. in diametro apice antice lamina late triangulari instructum, lamina transverse  $\sim$ -formi 7 mm. lata  $2\frac{1}{2}$  mm. longa medio

rugoso-crassa basi utraque latere auriculis instructa, auriculis rotundatis  $1\frac{1}{2}$  mm. in diametro, margine subintegrum. Pollinia 2 ovoidea 1 mm. longa ad centrum minute 1-foveolata, stipite lineari  $1\frac{1}{2}$  mm. longo, glandula elliptica 1 mm. longa antice 2-lobata.

HAB. Pinansha, leg. T. SÖMA, Mart., 1913.

*Sarcanthus* LINDL.

***Sarcanthus fuscomaculatus* HAYATA sp. nov. (Fig. 48)**

Epiphyta; radices aëriæ a latere caulis oriundæ simplices teretes albæ 5 mm. in diametro apice 2-3-divisæ. Caulis 30 cm. longus teres 5 mm. in diametro vaginis foliorum obtectus, vaginis 2-3 cm. longis 1 cm. latis cum foliis articulatis. Folia linearia 16 cm. longa 17 mm. lata basi apiceque æquilata apice biloba (lobis inæqualibus 5-7 mm. longis 6 mm. latis) basi plicata cum vaginis articulata in exsiccato coriacea.

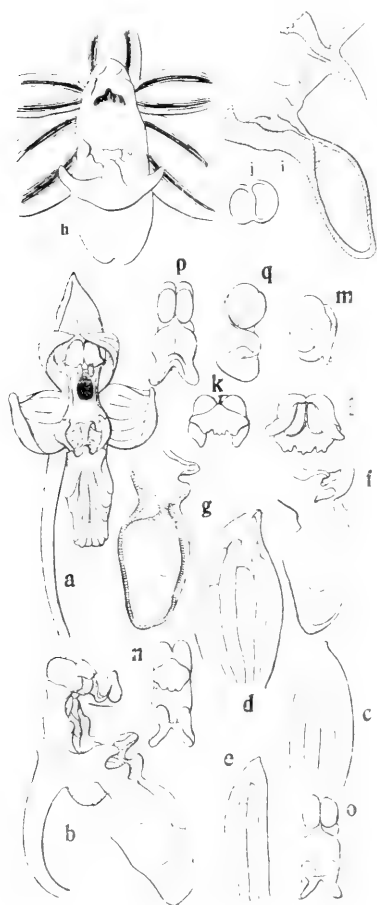



Fig. 48, *Sarcanthus fuscomaculatus* HAYATA; a, a flower; b, another flower, sepals, petals and terminal lobe of the lip taken off; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip, seen from side; g, the same in vertical section, terminal lobe taken off; h, a lip and column, seen from front; i, the same, in vertical section; j, transverse section of a spur; k, an operculum, seen from front; l, the same, seen from back; m, the same, seen from side; n, pollinarium with an operculum; o, pollinarium, seen from front; p, the same, seen from back; q, the same, seen from side.

Panicula lateralis 20–25 cm. longa, pedunculis (partibus non floriferis) 10 cm. longis glabris, ramis 4–5 simplicibus 8 cm. longis gracilibus patentibus desuper recurvis, floribus a se 5 mm. remotis, bracteis triangularibus 2 mm. longis acutis  $1\frac{1}{2}$  mm. latis retrorse reflexis. Sepalum posticum  $4\frac{1}{2}$  mm. longum oblongum  $2\frac{1}{2}$  mm. latum basi haud contractum obscure 3-nerviū apice obtusum, lateralia oblonga  $4\frac{1}{2}$  mm. longa 3 mm. lata apice rotundato-obtusa basi haud contracta. Labellum ad pedem brevem columnæ affixum 4 mm. longum basi calcaratum, calcari 5 mm. alto 2 mm. lato apice obscure 2-lobo vel emarginato intus lamina una verticali partito 2-loculari intus prope orem hirsuto ore callosis posterioribus lateralibusque semiclauso, lobis lateralibus latissime triangularibus 1 mm. longis 2 mm. latis erectis margine interiore recurvis apice obtusis, lobo terminali -formi 2 mm. longo basi latissimo 4 mm. lato ad insertionem constricto 1 mm. lato 3-lobulato, lobulis basilaribus (lateralibus) triangulari-linearibus 2 mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis, lobulo terminali anguste triangulari  $1\frac{1}{2}$  mm. longo  $1\frac{1}{2}$  mm. lato apice interiore incurvo cum facie connato. Columna 2 mm. longa 1 mm. lata a basi in pedem 1 mm. longum alatum producta, anthera globosa 1 mm. in diametro 2-locularis. Pollinia 2, singulum 2-lobatum, stipite late lineari 1 mm. longo  $\frac{1}{2}$  mm. lato. Flores flavi; sepala et petala intus prope marginem fusco-punctato-maculata; columna basi fusco-maculata.

HAB. Formosa: loco non indicato; cult. in seminario Taihoku.

*Cleisostoma* BLUME.

**Cleisostoma brachybotrya** HAYATA sp. nov. (Fig. 49). Epiphyta. Caulis 7 cm. longus tota longitudine foliatus. Folia approximata subdistiche disposita linearia 15 cm. longa 3 cm. lata apice subtruncata subbiloba, (lobo altero longiore 6 mm. longo 5 mm. lato apice obtuso, lobo altero subnullo apice truncato) margine integra in exsiccatu tenuiter coriacea basi  $\pm$  contracta ad basin plicata cum vaginis articulata, vaginis imbricatis non cylindraceis plicatim caudem amplexantibus 2 cm. longis in explicato 2 cm. latis nervosis. Racemi axillares 3 cm. longi vel longiores, pedunculis (partibus non-floriferis)  $1\frac{1}{2}$  cm. longis, partibus floriferis cylindrico-globosis 2–3 cm. longis vel longioribus 2 cm. latis, bracteis late triangularibus 2 mm. longis basi totiusque latis pedicellum amplexantibus, pedicellis 2 mm. longis divaricatis glabris,

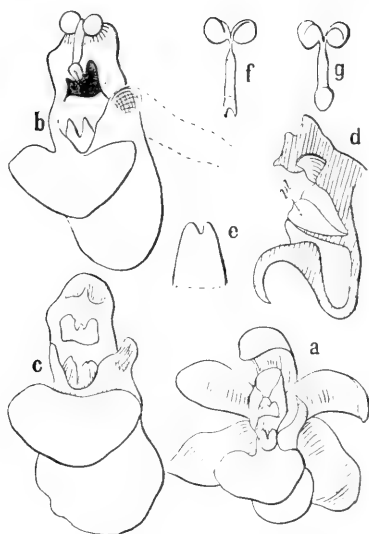


Fig. 49, *Cleisostoma brachybotrya* HAYATA; a, a flower; b, a lip and column; c, the same, anther taken off; d, the same, in vertical section; e, transversal plate; f, transversal plate at the mouth of the sac; g, transversal plate at the mouth of the sac; f, g, pollinaria, seen from different sides. shaded portions fig. in a, b and c, show purple coloration.

lobis lateralibus ad orem sacci erectis brevioribus, lobo terminali antice patenti desuper recurvo late rotundato vel transverse semi-rotundo apice acuto-obtuso 3 mm. longo 4 mm. lato basi contracto 2 mm. lato. Columna  $1\frac{1}{2}$  mm. longa basi contracta 1 mm. lata apice dilatata  $1\frac{1}{2}$  mm. lata.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, leg. B. HAYATA Mart. 1914.

**Cleisostoma ionosma** LINDL.; HAYATA Ic. Pl. Formos. II. p. 134.

*Stauropsis luchuensis* ROLFE in Kew Bull. 1907, p. 131.

HAB. Formosa: Kuskusu, leg. B. HAYATA et S. SASAKI, 1912, Juni.

**Cleisostoma oblongisepala** HAYATA (Fig. 50) Ic. Pl. Formos. II.

ovariis 3 mm. longis 1 mm. latis cylindraceis. Flores apertientes 6 mm. in diametro; sepala et petala crassa extus viridi-flavescentia intus apice basique purpurascentia; labellum albescens basi utroque latere purpureo-maculatum. Sepalum posticum obovatum 5 mm. longum  $2\frac{1}{2}$  mm. latum 3-nervium apice obtusum basi  $1\frac{1}{2}$  mm. latum  $\pm$  concavum, lateralia late obovata 4 mm. longa 3 mm. lata apice obtusissima basi 2 mm. lata sub-plana trinervia, nervis vix visis. Petala lineari-spathulata  $4\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi angustata, nervis haud visis. Labellum basi columnæ affixum basi saccatum, sacco 4 mm. profundo  $2\frac{2}{3}$  mm. lato ore squama posteriore lineari 2 mm. longa apice 2-loba sub-clauso, 3-lobum,

II. p. 134. Herba epiphytica, radicibus teretibus 3-4 mm. in sectionis diametro, caulibus 25 cm. longis a basi usque ad apicem foliosis teretibus 4-5 mm. in sectionis diametro, vaginis foliorum imbricatis caulem amplectantibus glabris. Folia crassa viridia glabra disticha alterna angustata 10 cm. longa 17 mm. lata apice aristato-acuta basi abrupte contracta ad vaginam abeuntia supra ad costas impressa, supra plana, costis et venis non visis,

basi plus minus tortuosa cum vaginis articulata, margine integra plus minus recurvata, vaginis cylindraceis circ. 3 cm. longis ore truncato-obliquis. Racemi axillares breves 2 cm. longi pauciflorati. Flores apertientes 1 cm. in diametro albicantes centro rubescentes, pedicellis brevibus (cum ovariiis) 4 mm. longis triquetris 3-costatis, bracteis brevibus 1-2 mm. longis triangularibus basi dilatatis pedicellum semi-amplectantibus. Sepala: posticum oblongum 7 mm. longum  $4\frac{1}{2}$  mm. latum apice rotundatum concavum, lateralia plus minus obliqua breviora quam postico. Petala obovato-oblonga  $6\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata. Labellum plus minus versus apicem rubescens ad columnam adnatum  $4\frac{1}{2}$  mm. longum basi saccatum, (sacco brevi squama postica clauso, squama lineari minute hirtella), 3-lobatum, lobis lateralibus minutis ad latus oris sacci adnatis obtusis dentiformibus, lobo medio erecto emarginato centro mucronato intus hirtellato. Anthera 2 mm. longa antice breve producta. Pollinia 4, per paria conferta, stipite hyalino; Columna apice rubescens 3 mm. longa.

HAB. Botansha, leg. C. ŌWATARI, 1898. The orchid was brought back to the Koishikawa Garden by Mr. C. ŌWATARI in his first expedition to Formosa.

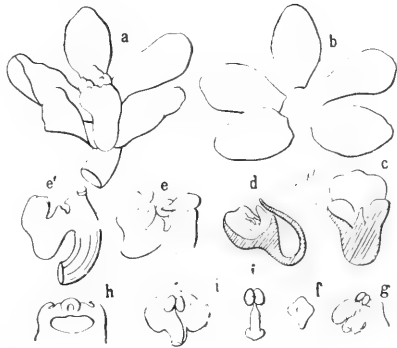


Fig. 50. *Cleisostoma oblongisepala* HAYATA; a, a flower; b, detached sepals and petals; c, a labellum, seen from front, vertical plate is seen; d, the same, seen from side, medially cut; e, column and labellum; f, an anther; g, apical portion of the column, seen from side, pollinarium is seen; h, the same, seen from front, stigma and horseshoe-shaped glands are seen; i, a pollinarium.

**Cleisostoma taiwaniana** HAYATA n. n. (Fig. 51). *Sarcanthus taiwanianus* HAYATA in Mater.

Fl. Formos. p. 337.

Owing to an erroneous observation, it was first recorded that this orchid has a spur divided by a longitudinal plate and consequently was regarded as a species belonging to *Sarcanthus*. Afterwards, I became aware of that this has no plate but thickenings. It should, therefore, be transferred from *Sarcanthus* to *Saccolabium*.

OBSERV. Herba epiphytica, caulibus



Fig. 51. *Cleisostoma taiwaniana* HAYATA; a, a flower; b, the same, seen from back, ovary taken off; c, a lip and column, seen from side; d, the same, medially cut, anther taken off; e, a lip, detached from column to show lateral appendages and vertical thickening; f, an operculum, seen from front; g, the same, seen from within; h, pollinarium.

erectis validis teretibus foliatis non pseudo-bulbosis 25 cm. longis, vaginis persistentibus caulem obtegentibus. Folia disticha carnosula plana late linearia 30 cm. longa 4 cm. lata apice oblique emarginata sessilia cum vaginis articulata, vaginis persistentibus 5 cm. longis. Paniculae laterales quasi-axillares validiusculae recurvae ramosae, ramis 5-6 divaricatis validiusculis 4 cm. longis, bracteis minutis squamosis triangularibus. Flores parvi 1 cm. in diametro brevis pedicellati flavo-viridescens intus purpurascens, pedicellis 2-3 mm. longis transverse divaricatis. Sepala libera aequalia patentia carnosula obovato-oblonga 5 mm. longa  $3\frac{1}{2}$  mm. lata apice obtusa. Petala sepalo angustiora 4 mm. longa  $1\frac{1}{2}$  mm. lata apice rotundata postice reflexa. Labellum basi columnae affixum continuum patens basi calcaratum, (calcare brevis cylindraceo 3 mm. longo  $1\frac{1}{2}$  mm. lato ore antice lamina longitudinali semi-diviso, ad os postice lateraque callosa-appendiculato), 3-lobatum, lobis lateralibus ad

latus calcaris sitis brevibus auriculiformibus, lobo medio latiusculo 3 mm. long, 5 mm. lato semiorbiculari apice rotundato margine denticulato medio late callosoruguloso patenti.

Columna breve oblonga subteres 2 mm. longa. Clinandrium truncatum.

HAB. Formosa, leg. T. UCHIYAMA, 1899.

*Physurus* RICH.

*Physurus chinensis* ROLFE (Fig. 52); MATSUM. et HAYATA Enum. Pl. Formos. p. 409.

HAB. Mt. Arisan, leg. B. HAYATA et T. Itô, Mart. 1914.

This orchid drawn in the accompanying

figures is perhaps identical with ROLFE's species, so far as the original description is concerned. The type I have never seen.

*Anæctochilus* BLUME.

*Anæctochilus bisaccatus* HAYATA sp. nov. (Tab. XV.) *Odontochilus bisaccatus* HAYATA in sched. Herb. Taihoku. Terrestis, radices paucæ in crassatæ. Caulis cum racemis 20–25 cm. longus teres subglaber, internodiis inferioribus 4 cm. longis, superioribus 2 cm. longis inferiore defoliatu infra medium usque ad basin racemi foliatus suberectus vel ascendens. Folia alterna a se 2 cm. remota petiolata, lamina oblonga  $4\frac{1}{2}$  cm. longa 2 cm. lata apice acuta vel obtuso-acuta ad summum mucronata basi acuta supra atroviridi ad costas albo-lineata subtus sub-pallida, petiolis (vaginis exceptis) 6 mm. longis gracilibus basi dilatatis ad vaginas expantibus, vaginis 5–7 mm. longis 4 mm. latis cylindricis hyalinis ore obliquis latoribus, foliis superioribus minoribus in racemis ad bractæas reductis. Racemi hirsuti 5 cm. longi

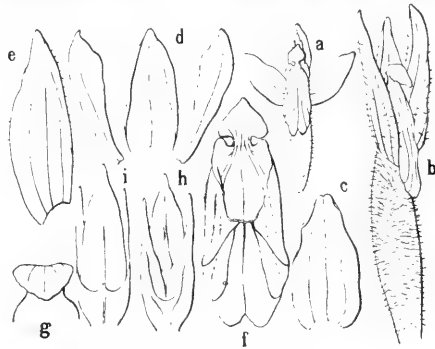


FIG. 52, *Physurus chinensis* ROLFE; a, a flower, slightly expanded; b, the same, seen from side; c, a hood formed by a dorsal sepal and petals; d, the same, separated; e, a lateral sepal; f, a lip, seen from inner side; g, apical portion of the same; h, apical portion of column, seen from front; i, the same, seen from back.

basi non floriferi, partibus non floriferis  $1\frac{1}{2}$  cm. longis hirsutis, bracteis non floriferis sessilibus lanceolatis basi amplexicaulibus 14 mm. longis 4 mm. latis apice acutis 3-nerviis, bracteis floriferis sub floribus lanceolatis pedicellos amplexantibus margine ciliatis vel hirsutis lanceolatis 12 mm. longis 3 mm. latis, pedicellis cum ovariis 7 mm. longis bractea brevioribus glabris gracilibus 1 mm. in diametro. Flores cinereo-flavescentes. Sepalum posticum late ovatum  $4\frac{1}{2}$  mm. longum 3 mm. latum apice caudato-obtusum ad summum obtusum basi vix contractum 1-nervium, venis non visis, glabrum; sepala lateralia oblique oblonga 6 mm. longa 3 mm. lata apice obtusa basi contracta latere superiore 1 mm. lata, margine sursum interiore recurva, latere inferiore 2 mm. lata margine deorsum prope basin interiore recurva, duo basi se connata saccum 2-lobatum formantia saccum vel calcar labelli involventia 1-nervia utraque pagine glabra. Petala obliqua late semi-ovata 5 mm. longa  $2\frac{1}{2}$  mm. lata apice caudato-obtusa basi breve attenuata basin contracta subfalcato-curva cum sepalo posteriore connata galeam formantia 1-nervia latere exteriori 2 mm. lata latere interiore  $\frac{1}{2}$  mm. lata glabra. Labellum Y-forme perfecte liberum ad basin columnae adnatum basi saccatum, sacco globoso 2 mm. lato  $1\frac{1}{2}$  mm. longo profunde 2-sacculato (sacculis apice 2-lobatis) basi intus medio posteriore callosis duobus instructo (callis cornuformibus  $1\frac{1}{2}$  mm. longis ascendente-recurvis), latere oris sacci utroque 1-appendiculatum, appendiculis minutis  $\frac{1}{5}$  mm. longis crassis, mesochilo 6 mm. longo lineari margine pectinato, dentibus pectinis utroque latere 3-4-5, superioribus longioribus linearibus 3 mm. longis  $\frac{1}{3}$  mm. latis apice obtusis, medio secus longitudinem 2-lamellato, lamellis linearibus  $\frac{1}{3}$  mm. latis sursum ad lobos laminae abeuntibus, lamina (epichilo) 2-lobata, lobis oblique obovato-rectangularibus 5 mm. longis 3 mm. latis a se angulo  $50^\circ$  divaricatis apice rotundato-obtusis, sinibus inter lobos triangulari-truncatis. Discus medio mesoculi ad medium 1-striatus. Columna brevissima  $\frac{1}{2}$  mm. longa antice 2-appendiculata, appendiculis alaformibus, apice cornuformibus suberectis triangularibus apice obtusis crassiusculis  $\frac{1}{3}$  mm. latis. Clinandrium dorsale profunde concavum. Anthera dorsalis erecta sessilis ovata 2 mm. longa 1 mm. lata apice longicaudata basi cordata. Pollinia 2, singulum clavato-obovatum apice 2-lobatum basi attenuatum ad pseudocaudiculam unam se connatum. Rostellum 2-partitum, (partibus rostriformibus apice cartila-



gineo-acuminatis sub-tortuosis, latere exteriori appendiculatis). Stigma sub rostellulo 2-partitum, partibus subrotundatis subplanis, vel medio sub-lobato-plicatum. Ovarium cylindricum tortuosum 9 mm. longum  $1\frac{2}{3}$  mm. in diametro glabrum sed minute muricatum.

HAB. Rinkiho, ad 5000 ped. alt., 1911, Aug.

Near *Odontochilus lanceolatus* BENTH. (*Anæctochilus lanceolatus* LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. VIII. t. 392); but differs by the shape of the lips and their appendages.

***Anæctochilus formosanus* HAYATA** sp. nov. (Fig. 53). Caulis circ. 20 cm. longus inferiore foliatus glaber. Folia ovata vel rotundato-ovata  $4\frac{1}{2}$  cm. longa 27 mm. lata apice acuta vel acuto-mucronata basi rotundata ad extremitatem subito acuta ad petiolum abeuntia 5-nervia supra velutinoso-nitida eleganter aureo-reticulata subtus (in exsiccat) rubescentia. Caulis florifer 4-5 cm. longus pauci-floratus, rhachibus hirsutis, bracteis ovato-lanceolatis

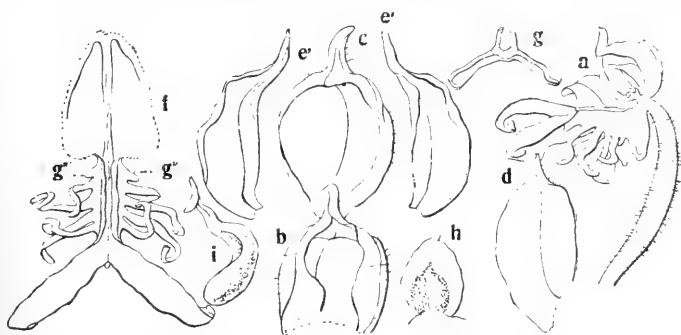


Fig. 53, *Anæctochilus formosanus* HAYATA; a, a flower; b, a hood, formed by a dorsal sepal and two petals; c, a dorsal sepal, e, e, petals; f, a lip; g, a section of a portion mentioned by g' g'' in fig. f; h, an anther, dorsal view; i, a pollinarium.

1 cm. longis concavis basi contractis alabastrum floris amplectantibus extus hirsutis intus glabris, pedicellis nullis, ovariis cylindrico-fusiformibus  $1\frac{1}{2}$  cm. longis ad utranque extremitatem angustatis breve hirsutis. Sepalum posticum cuspidato-rotundatum 6 mm. longum  $5\frac{1}{2}$  mm. latum dorso hirsutum intus glabrum valde concavum cum petalis connatum galeam formans apice exteriori

reflexum apice cuspidatum, cuspidē 1 mm. longo apice obtuso, margine incurvum 1-nerviū, lateralia ovato-oblonga valde obliqua 8 mm. longa  $4\frac{1}{2}$  mm. lata apice breve cuspidata ad summum obtusa 1-nervia extus hirsuta intus glabra patentia. Petala semi-ovata valde obliqua 7 mm. longa  $2\frac{1}{2}$  mm. lata apice cuspidata, cuspidē 2 cm. longo, 1-nervia cum sepalo postico conniventia galeam formantia. Labellum Y-forme, mesochilo 5-6 mm. longo ad longitudinem plicato subtus medio 1-costato ad costam fimbriis 2-seriatis instructo, fimbriis lineari-filiformibus 5 mm. longis  $\frac{1}{3}$  mm. latis, lamina (epichil) profunde 2-lobata, lobis lineari-angustatis 7 mm. longis 3 mm. latis apice obtusis divaricatis; calcar sacciforme triangulare 4 mm. longum 3 mm. latum intus prope basin latere anteriore 2-tuberculatum, tuberculis lamelliformibus  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis obscure denticulatis. Columna brevis 1 mm. longa, anthera oblonga 4 mm. longa.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, leg. B. HAYATA, 1914, Mart.

Near *A. Roxburghii* LINDL. (Orchids of the Sikkim Himalayas, Ann. Roy. Bot. Gard. Calc. VIII. t. 390); but differs from it by the cream-yellow flowers with more fimbriate mesochils.

**Anæctochilus Inabai** HAYATA sp. nov. (Tab. XVI.) Terrestis; caulis incrassatus 3-4 mm. in diametro teres inferiore glaber, internodiis superioribus 2 cm. longis. Folia 2 cm. a se remota alterna, lamina ovato-oblonga vel oblonga apice acuta vel acuto-acuminata basi rotundata vel rotundato-obtusa  $4\frac{1}{2}$  cm. longa 2 cm. lata glabra, petiolis (vaginis exceptis) 1 cm. longis basi gradatim ad vaginam dilatatis, vaginis 12 mm. longis 4 mm. in diametro ore obliquissimis basi cylindricis, partibus cylindricis brevissimis semihyalinis. Racemi cum pedunculis 13 cm. longi hirsuti, partibus floriferis 5-6 cm. longis, partibus non floriferis (pedunculis) 7-8 cm. longis erectis bracteis 2-3 instructis, bracteis non floriferis lanceolatis hirsutis rubescentibus 1 cm. longis semi-amplexicaulibus, bracteis floriferis sub flore ovato-lanceolatis 1 cm. longis apice acuminatis hirsutis rubescentibus basi  $\pm$  contractis obtusis, pedicellis nullis, ovariis cylindricis vel cylindrico-ovatis 1 cm. longis. Flores rosei. Sepala inæqualia, posticum ovatum vel late ovatum  $5\frac{1}{2}$  mm. longum  $3\frac{1}{2}$  mm. latum apice subcaudato-obtusum ad apicem uncinato-

obtusum basi  $\pm$  contractum 1-nerviis, venis utroque latere nervi 1-2 alternis, fusco-viride sed prope marginem et secus nervos et venas laterales album intus glabrum extus glanduloso-barbatum basi cum petalis connatum galeam formans; sepala lateralia falcato-oblonga 11 mm. longa obliqua  $4\frac{1}{2}$  mm. lata apice acuto-obtusa basi cum basi labelli et se connata. Petala lunuliformia linearia falcato-curva obliqua 7 mm. longa  $1\frac{1}{2}$ - $1\frac{2}{3}$  mm. lata quam sepalo postico vix longiora vel æquilonga apice acuto-obtusa basi vix contracta utraque glabra basi ad sepalum posticum adnata sursum subconnata galeam formantia, saccum labelli involventia intus glabra extus glanduloso-barbata 1-nervia, (venis lateralibus utroque latere nervi 3 alternis acute ascendentibus), fusco-viridia prope marginem secus nervos venasque albo-reticulata. Labellum Y-forme cum hypochilo mesochilo epichiloque 23 mm. longum basi saccatum cum sepalis lateralibus connatum mentum 1-2 mm. longum formans, sacco globoso 3 mm. longo basi leviter 2-lobo, lobis basi interiore callo uno instructis, callis lamelliformibus rectangularibus 1 mm. longis, lamina (epichilo) longe unguiculata, ungue (mesochilo) in ambitu lanceolato-lineari 9 mm. longo 2-3 mm. lato plus minus crassiusculo longe pectinato (dentibus pectinis inferioribus brevibus, superioribus longioribus 7-8 mm. longis angulo  $45^\circ$  antice divaricatis) medio secus longitudinem 2-lamellato, lamellis sursum ad lobos laminæ abeuntibus, lamina (epichilo) alte divaricatim 2-lobata ad sinus inter lobos obtuso-mucronata, lobis divaricatis oblique rectangulari-oblongis 1 cm. longis 5-6 mm. latis apice truncato-obtusis, (sinibus inter lobos rotundato-cuspidatis), margine integra glabra. Columna circ.  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata dorso complanata; anthera dorsalis verticaliter sita (posterior) cordato-ovata 3 mm. longa 2 mm. lata apice caudato-acuta basi subcordata sessilis 2-ocularis; pollinia 2, bipartita vel apice 2-lobata cum pseudocaudicula 4 mm. longa clavato-obovata, pseudocaudicula 1 tortuoso  $1\frac{1}{2}$  mm. longa, glandula oblonga  $\frac{1}{2}$  mm. longa. Clinandrium valde concavum latere ad rostellum abeuns; rostellum subcartilagineum rotundatum apice aristato-2-lobatum; stigma duo, singulum circ. connatum vel distans infra rostellum situm, appendiculis columnæ 2 cornuformibus infra stigma sitis ascendentibus crassis 1 mm. longis obtusis. Ovarium sessile cylindricum 9 mm. longum 2 mm. in diametro hirsutum.

*Odontochilus Inabai* HAYATA (Herb. Taihoku).

HAB. Rinkihō, ad 5000 ped. alt., leg. H. INABA, Aug. 1911, fl. rosei, (fide INABA).

Near *Odontochilus grandiflorus* BENTH. = *Anæctochilus grandiflorus* LINDL. (Orchids of the Sikkim Himalayas, in ANN. ROY. BOT. GARD. CALC. VIII. t. 393), but differs from it by the much longer pectinate claws of the lips and in having hairy sepals.

***Anæctochilus koshunensis*** HAYATA sp. nov. (Fig. 54). Radices incrassatæ. Caulis teres solitarius (cum racemis) 16 cm. longus basi 3 mm. crassus a basi usque ad medium foliatus supra medium vaginato-squamatus sursum spicatim florifer simplex incrassatus rubero-purpurascens (in exsiccato) deorsum subglaber sursum pubescens prope basin minus foliatus, prope medium approximativ foliatus, supra medium usque ad apicem aphyllus. Folia alterna ad medium caulis approximativ 3-4 sita petiolata, lamina rotundato-ovata  $2\frac{1}{2}$  cm. longa 18 mm. lata apice obtuso-acuta mucronatim acuta basi rotundata ad petiolum acuta margine integra crassiuscula utraque pagine glabra in exsiccato membranacea supra in exsiccato fuscenti subtus rubro-purpurascenti 5-nervia, nervis parallelis lateralibus infra apicem ad nervum centralem attingentibus, venis et venulis reticulatis, supra ad nervos venas venulasque albo-reticulata, petiolis cum vaginis 1 cm. longis linearibus, partibus linearibus 5 mm. longis 1 mm. latis plicatis paullo pubescentibus, vaginis 3-5 mm. longis ore oblique truncatis 5 mm. latis circ. 10-nerviis semi-hyalinis rubescentibus. Spicæ simplices 5-6-floratæ  $4\frac{1}{2}$  cm. longæ, pedunculis (partibus caulis aphyllis) 7 cm. longis 2-3 bracteatīs, bracteis sub flore ovatis rubescentibus 7 mm. longis 3-4 mm. latis apice cuspidato-acuminatis 1-nerviis alabastrum floris amplexantibus intus glabris extus pubescentibus. Flores alterni breve pedicellati vel subsessiles suberecti. Sepala inæqualia; posticum late rotundato-ovatum 5 mm. latum totiusque longum basi non contractum apice cuspidatum ad summum obtusum intus glabrum extus pubescens 1-nervium intus valde concavum sursum valde reflexum cum petalis connatum galeam formans dorso ad nervum elevatum; lateralia oblique oblonga plus minus patentia 8 mm. longa 4 mm. lata valde concava oblique apice obtusa basi non contracta 1-nervia, nervis recurvis, intus glabra extus pubescentia rubescentia, nervis

dorso elevatis ascendentibus. Petala tenuissima hyalina valde obliqua semi-obovata apice cuspidato-acuta basi attenuato-contracta sursum reflexa latere superiore cum sepalis adnata galeam formantia valde obliqua latere inferiore 2 $\frac{3}{8}$  mm. lata latere superiore  $\frac{1}{10}$  mm. lata 6 mm. longa 1-nervia utraque pagine glabra. Labellum glabrum basi ad basin columnæ adnatum longe calcaratum (calcar ad orem valde obliquo latere posteriore 5 mm. longo latere anteriore 9-10 mm. longo medio 2 mm. lato intus latere posteriore infra columnam proboscis 2 instructo deorsum antice plus minus recurvo ad apicem 2-lobato, lobis 2 mm. longis

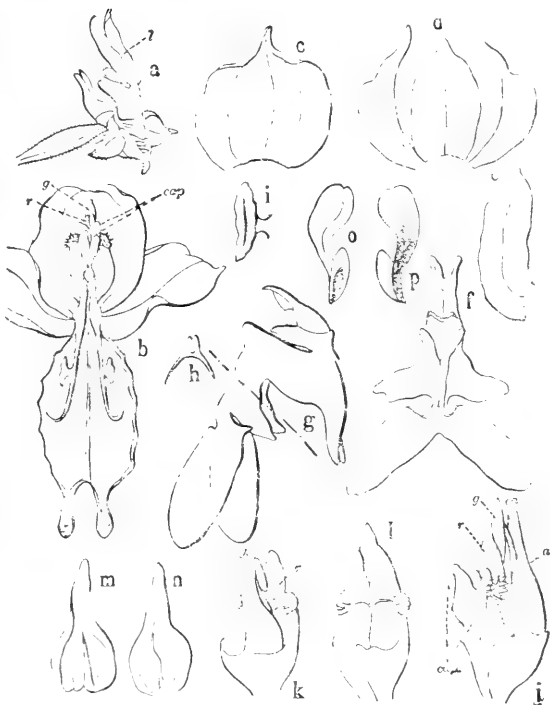


Fig. 34. *Anoechilus koslanensis* HAYATA; a, a flower; b, another flower, lamina of the lip taken off, spur explicated, to show column, columnal appendages, stigmata, rostellum, gland and two basal appendages of the spur; c, a dorsal sepal and petals, connated into a hood; d, a dorsal sepal and petals, separated; e, a lateral sepal; f, a detached lip, seen from face; g, the same lip, with column and anther, seen from side; h, cross section of the same at chain-line; i, a basal appendage of the spur; j, a column, seen from side; k, the same, seen from back; l, the same, anther taken off, showing clinandrium; m, an anther, seen from front; n, the same, seen from back; o, pollinarium, seen from face; p, the same, seen from back.

l=lip; cap=columnal appendages; r=rostellum; g=gland; cl=caudicle of pollinia; a=anther; st=stigma.

1 mm. latis apice obtusis rectis, versus orem antice utroque latere lobis erectis triangularibus instructum (lobis acutis latere anteriore ad mesochilum abeuntibus), mesochilo a calcari angulo  $90^\circ$  egresso 3–4 mm. longo secus medium plicato margine conduplicato-plicato subtus secus longitudinem appendiculis 2 instructo, appendiculis late pinni-formibus 4 mm. longis 2 mm. latis apice antice obtusis desuper falcatis, lamina (epichilo) bipartita, partibus verticaliter sitis parallelis oblique oblongis 8 mm. longis  $3\frac{1}{4}$  mm. latis apice rotundatis vel obtusis, ad sinus inter partes distincte mucronata, mucrone desuper reflexo. Columna a basi usque ad apicem rostellii 3 mm. longa basi constricta latere anteriore appendicibus instructa, appendicibus anterioribus 2 alaeformibus, alis verticalibus parallelis apice 2-lobatis, lobis superioribus magnis triangularibus 1 mm. latis intus sacciforme excavatis, lobis inferioribus minoribus; appendices columnæ apice liberæ sub rostelllo rostelliformes; stigmata 2 distantia utroque latere basi rostellii sita; rostellum cartilagineum validum 2-fidum 1 mm. longum; anthera dorsalis erecta sessilis lanceolato-ovata 4 mm. longa  $1\frac{1}{2}$  mm. lata apice rostrato-attenuata basi rotundata leviter 2-lobata 2-ocularis; pollinia 2 sectilia obovato-lanceolata basi longe attenuata ad caudiculas abeuntia; glandula fusiformis, ad utranque extremitatem acuta  $1\frac{1}{4}$  mm. longa  $\frac{1}{2}$  mm. lata; clinandrium profunde excavatum. Ovarium fusiforme a lamina labelli angulo  $90^\circ$  egressum 12 mm. longum 4 mm. latum pubescens utrinque contractum basi plus minus attenuatum sessile vel brevissime pedicellatum.

HAB. Kōshūn.

Differs from all the species of *Anæctochilus* by the mesochil which is not afforded with pectinate lobes, but has broadly entire wingformed lobes, by the columnal appendages which are doubly folded and beak-shaped at the apex, and by the triangular lateral lobes at the mouth of the spurs. It may constitute a new genus (*Aviglossum*, I should propose to call it), when the above mentioned characters are fully ascertained by the study of a living material.

### *Zeuxine* LINDL.

*Zeuxine arisanensis* HAYATA sp. nov. (Fig. 55). Terrestres; radices paucæ incrassatæ. Caulis cum racemo terminali 25 cm. longus supra basin usque ad infra medium foliatus. Folia in exsiccatu tenuiter membranacea

ovata vel ovato-lanceolata apice acuta basi obtuso-rotundata ad petiolum contracta 4 cm. longa  $1\frac{1}{2}$  cm. lata, petiolis (cum vaginis)  $1\frac{1}{2}$  cm. longis basi dilatatis vaginiformibus caulem amplexantibus. Partes floriferæ 6 cm. longæ, partibus inter floriferam et foliiferam 11 cm. longis hirsutis squamatis, squamis  $1\frac{1}{2}$  cm. longis apice acuminatis basi vaginiformibus caulem amplexantibus a se 3 cm. remotis subrubris tenuiter scariosis. Flores densiuscule dispositi lineari-ovoidei 8 mm. longi  $2\frac{1}{2}$  mm. lati hirsuti, bracteis lanceolatis. Sepalum posticum valde concavum ovatum 5 mm. longum apice acuto-obtusum basi leviter contractum 1-nerviū vel obscure 3-nerviū extus hirsutum intus gla-

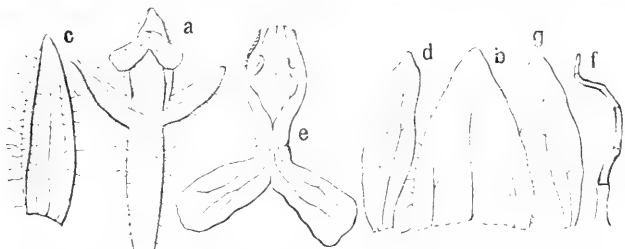


Fig. 55, *Zeuxine arisanensis* HAYATA; a, a flower; b, a dorsal sepal. expanded; c, a lateral sepal; d, d', petals; e, a lip; f, a hair on the flower.

brum cum petalis connatum galeam formans, lateralia oblique ovata 4 mm. longa 2 mm. lata apice acuto-obtusa interiore recurva basi  $\pm$  contracta extus hirsuta intus glabra 1-nerviā vel obscure 3-nerviā. Petala semi-oblonga  $4\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice obtusissima basi leviter contracta 1-nerviā, nervo valde excentrico, utraque pagine glabra. Labellum Y-forme, lamina tenuis 2-lobata, lobis angulo  $70^\circ$  a se divaricatis quadrangularibus apice obtusis  $2\frac{1}{2}$  mm. longis 1 mm. vel  $1\frac{1}{2}$  mm. latis, ungue crasso 1 mm. lato deorsum latiore cum columna connato tubum breve formanti margine intus carinato basi intus 2-tuberculato 3 mm. longo. Columna 1-2 mm. longa. Rostellum alte 2-lobatum, lobis linearibus 1 mm. longis.

HAB. Arisan, leg. S. SASAKI, Mart., 1911.

Near *Zeuxine reflexa* KING et PANTLING (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. VIII. t. 388), but differs from it by the shape of the columnal appendages.

*Cheirostylis* BLUME.

***Cheirostylis Inabai* HAYATA** sp. nov. (Fig. 56). Caudis ascendens 10–15 cm. altus tota longitudine foliatus, foliis inferioribus minoribus iis superioribus majoribus. Folia ovata 2 cm. longa 12 mm. lata apice acuta vel obscure mucronato-acuta basi rotundata subito ad petiolum abeuntia a se 2 cm. remota in

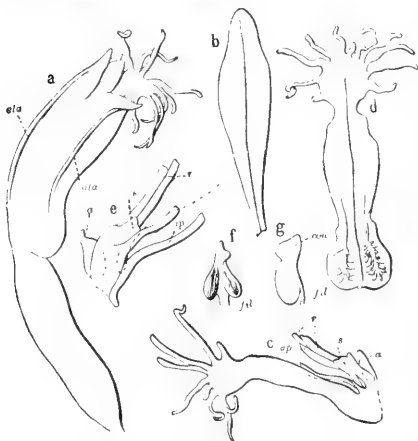


Fig. 56, *Cheirostylis Inabai* HAYATA; a, a flower; b, a petal; c, a flower, sepals and petals taken off; d, a lip; e, column; f, an anther, seen from face; g, the same, seen from side; n = anther, r = rostellum, ap. = columnal appendages, s = stigma, ala = wings, fil = filament.

exsiccatu tenuiter membranacea, petiolis  $1\frac{1}{2}$  cm. longis apice 2 mm. latis deorsum dilatatis prope basin vaginiformibus, partibus vaginiformibus 5 mm. longis totiusque latis. Flores pauci racemosi, racemis terminalibus simplicibus 2–3 cm. longis, pedunculis (partibus non floriferis) 1 cm. longis breve hirsutis, bracteis ovato-lanceolatis 8 mm. longis 2 mm. latis apice acuminatis, pedicellis hirsutis 2 mm. longis, ovariis cylindricis 1 cm. longis 2 mm. latis. Flores albi oblique cylindracei subdeclinati 1 cm. longi

(ovariis exceptis) 4 mm. lati apice  $\pm$  angustiores basi rotundato-contracti. Sepala lineari-lanceolata 1 cm. longa  $2\frac{1}{2}$  mm. lata medio dorso carinato-alata ad marginem a basi usque ad prope apicem connata tubum formantia, tubo subdeclinato basi antice obscure vel vix ventricoso apice 3-lobato lobis oblongo-triangularibus 3 mm. latis apice acutis. Petala lineari-spathulata 10 mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa deorsum attenuata tenuissima subhyalina erecta sublibera sursum  $\pm$  seculo postico adnata 1-nervia. Labellum erectum clavato-angustatum circ. 10 mm. longum apice a tubo sepalorum exsertum sursum supra medium contractum, parte supra contractionem rotundata 2 mm. in dia-



metro crassiuscula supra minute villosa margine fimbriata, fimbriis  $2\frac{1}{2}$  mm. longis, ad contractionem  $1\frac{1}{2}$  mm. latum, parte infra contractionem angustata 8 mm. longa 2 mm. lata lævi basi subventricosa, ventriculo sub 2-lobato intus 3-nervio ad nervos laterales fimbriis 2-seriatis instructo. Columna circ. 1 mm. longa; appendiculæ columnales lineares, partibus liberis 3 mm. longis  $\frac{1}{2}$  mm. latis. Rostellum alte 2-partitum, partibus linearibus  $3\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice truncatis.

HAB. Rinkoho, ad 5000 ped. alt., leg. H. INABA, Aug., 1911.

Near. *Cheirostylis chinensis*, but differs from it by the much larger leaves which are arranged from the base of the stems to the base of the peduncles.

*Arisanorchis* HAYATA n. g.

Sepala membranacea a basi usque ad prope apicem in tubum coalita subæqualia  $\pm$  declinata basi antice in saccum brevissimum producta. Petala sursum sepalò postico adnata deorsum libera. Labellum a basi columnæ erectum angustum petalò conforme elongato-oblongum circ. æquilatum apice non dilatatum intus non callosum ecalcaratum apice desuper leviter recurvum. Columna brevis apice brachio uno vel brachiis 2 erectis linearibus rostello æquilongis appendiculata. Stigmata distantia utroque latere basis rostellì sita. Rostellum alte 2-partitum, partibus acuminatis erectis. Clinandrium breve profunde excavatum. Anthera erecta acuminata 2-locularis, loculis se separatis. Pollinia sectilia, caudicula oblancoolata glandula lineari peltata inter partes rostellì sita. Herba aphylla terrestris debilis. Rhizoma repens tuberiferum. Scapi aphylli vaginis instructi simplices erecti. Flores parvuli in racemo laxiusculo dispositi breviter pedicellati.

HAB. Formosa. Species unica.

The new genus is more or less related to *Gastrodia*, *Aphyllorchis*, *Epipogon* and *Galera*, in its leafless habit. It is, however, closely allied to *Cheirostylis* in the gamophyllous perianth, deeply sinuate rostellum, sectile pollinia, one or two armed columnal appendages and stigmatic tissue at the base on each side of the rostellum. But it differs from it by the aphyllous habit, and by the nearly included long entire labellum with no distinction of a blade and claw and with no swelling at the base.

**Arisanorchis Takeoi** HAYATA, n. sp. (Fig. 57). Terrestis, tuberibus oblongo-ovoideis horizontaliter sitis circ. 1mm. longis 5mm. in diametro carnosis flavescenti-rubrescentibus singulis vel moniliforme continuis, apice scapum singulum emittentibus. Scapi erecti recti circ. 15 cm. longi aphylli fulvo-albescentes

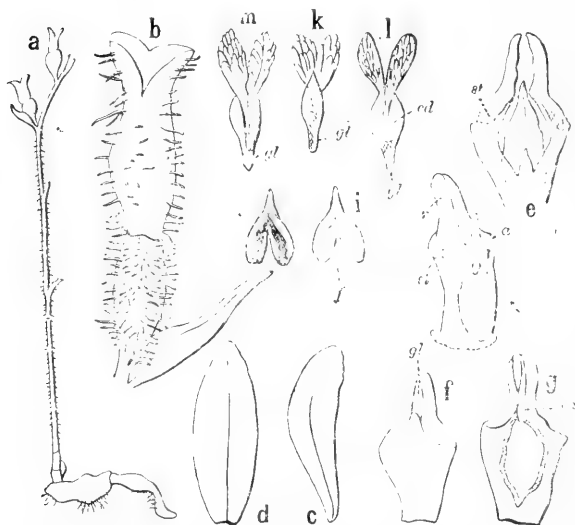


Fig. 57, *Arisanorchis Takeoi* HAYATA; a, the plant; b, a flower; c, a petal; d, a lip; e, a column, seen from front; f, the same, seen from back; g, the same, seen from back, anther and dorsal portion of the clinandrium taken off; h, the same, seen from side; i, an anther, seen from back; j, the same, seen from front; k, pollinarium; l, and m, the same, seen from another side; n=anther; o=columnal appendage; p=caudicle; q, filament; r=gland; s=rostellum; t=stigma; fig. a, natural size; others more or less magnified.

squamati, (squamis tenuissimis vaginiformibus a se 2-3 cm. remotis hyalinis circ. 1 cm. longis cylindricis, ore late obliquis apice acutis), tenuiter pilosi, pilis tenuissimis patentibus crispis, partibus floriferis 2 cm. longis, floribus generaliter 2-3 a se 1 cm. remotis subsecundis, pedicellis (exceptis ovariis) 3 mm. longis, bracteis sub pedicello lanceolatis semi-

hyalinis 6-7 mm. longis. Flores subalbi vel pallido-flavi, ovariis viridibus toto glanduloso-pilosis, pilis reflexis tenuissimis. Sepala toto connata tubum formantia toto tenuiter pilosa, tubo  $6\frac{1}{2}$  mm. longo  $2\frac{1}{2}$  mm. in diametro  $\pm$  declinato basi subito constricto ad orem leviter contracto, ore 2 mm. in diametro, basi anteriore plus minus minute saccato, (sacco obscuro vel  $\frac{1}{2}$  mm. producto), apice 3-lobato, lobo postico (sepalo postico) triangulari  $2\frac{1}{2}$  mm. longo

totiusque lato apice obtuso, lobis lateralibus postico minus latis conformibus. Petala sublibera oblique oblanceolata 6 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi  $\frac{1}{2}$  mm. lata ~ formiter falcata basi gradatim angustata. Labellum elongato-oblongum 6 mm. longum 2 mm. latum subinclusa subrecta suberecta sursum prope apicem desuper recurva apice obtusa basi 1 mm. lata. Columna 2 mm. longa. Clinandrium profunde excavatum; anthera bilocularis erecta apice cuspidato-appendiculata, loculis fusiformibus. Rostellum erectum 2-lobatum, lobis linearibus  $1\frac{1}{2}$  mm. longis a glandula lanceolata separatis. Pollinia 2 sectilia (granulis cuneiformibus  $\frac{1}{2}$  mm. longis) fusiformia, medio caudiculae peltatim affixa, caudicula oblanceolata  $2\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi attenuata flava hyalina; glandula lactacea linearis 1 mm. longa; stigmata lateralia basi utroque latere rostellum sita. Columna antice plana non alata, sed apice antice cum appendiculis simplicibus vel 2-partitis instructa, partibus linearibus secus rostellum productis 1 mm. longis rectis erectis.

HAB. Arisan: inter Karapin et Suisharyō, ad 3300 ped. alt., leg. TAKEO ITŌ, Mart. 28, 1914.

Found on a sunny place, growing in a clumps of *Kalanchoe spathulata*, apparently with some indirect connections with the latter.

### *Goodyera* R. BR.

**Goodyera bilamellata** HAYATA sp. nov. (Fig. 58). Caulis 15 cm. longus basi foliatus sursum racemosus. Folia oblongo-lanceolata 5 cm. longa 18 mm. lata apice acuta basi subito acuminata attenuata ad petiolum abeuntia chartaceo-membranacea in exsiccato margine subintegra vel minute crispata, petiolis 4 cm. longis basi vaginato-dilatatis caulem complete amplexantibus. Caules sursum hirsuti, partibus floriferis 5 cm. longis, floribus sessilibus a se 5 mm. remotis, bracteis lanceolato-ovatis 1 cm. longis 4 mm. latis apice acuminatis basi cuneato-angustatis extus hirsutis intus glabris 1-nerviis, ovariis 6 mm. longis tortuosis hirsutis. Sepalum posticum ovato-triangulare 9 mm. longum basi latissimum 4 mm. latum apice triangulari-acutum ad summum obtusum margine prope apicem interiore recurvum 1-nerviū concavum cum petalis galeam formans extus hirsutum, lateralia oblonga obliqua 1 cm. longa  $3\frac{1}{2}$  mm. lata 1-nervia sursum convoluta acuminata ad summum obtusa. Petala

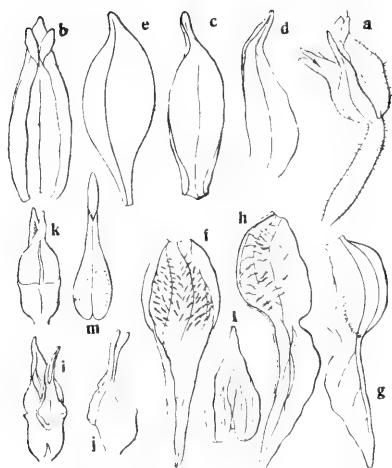


Fig. 58, *Goodyera bilamellata* HAYATA; a, a flower; b, a cap composed of a dorsal sepal and petals; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip, seen from front; g, the same, seen from side; h, the same, in vertical section; i, a column; j, the same, seen from side; k, the same, seen from back; l, an anther; m, pollinarium.

obovato - spatulata 1 cm. longa 3-4 mm. lata apice breve cuspidata obliqua basi cuneato-attenuata 1-nervia utraque pagine glabra. Labellum oblongum 8-9 mm. longum basi ventricosum, ventriculo extus glabro intus hirsuto, pilis 1 mm. longis, 4 mm. longo 3 mm. lato, sursum secus longitudinem plicatum, parte plicata utraque facie glabra 5-nervia explicato ovata 4 mm. longa 3 mm. lata discis 2-lamellatis instructa apice ad marginem recurva subacuta ad summum obtusa. Columna brevis, anthera cordato-ovata apice attenuata 4 mm. longa. Ros-

tellum bipartitum, partibus linearibus rectis 2 mm. longis.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Goodyera caudatilabella* HAYATA sp. nov.** (Fig. 59). Caulis 40-50 cm. longus basi vaginatus medio foliatus sursum racemosus. Folia oblongo-obovata circ. 20 cm. longa 6 cm. lata apice acuta basi attenuata ad petiolum 5 cm. longum abeuntia, venulis transversis manifeste reticulatis, in exsiccato membranacea, petiolis 5 cm. longis basi dilatatis vaginiformibus, vaginis 1-2 cm. longis 13 mm. latis. Caulis inter partem racemosam et foliosam squamatus, partibus squamigeris 17 cm. longis hirsutis, squamis triangulari-lanceolatis linearibus 14 mm. longis 2 mm. latis, partibus racemosis 20 cm. longis, floribus inferioribus remotis a se 1 cm. remotis, superioribus densiusculis, bracteis lineari-lanceolatis 1 cm. longis 1-2 mm. latis, pedicellis subnullis,

ovariis 8 mm. longis dense brevique crispato-hirsutis, pilis glandulosis. Sepalum posticum oblongum 6 mm. longum 3 mm. latum apice acutum margine plus minus recurvum cum petalis galeam formans 3-nervium extus glanduloso-hirsutum intus glabrum; sepala lateralialia valde concava  $6\frac{1}{2}$  mm. longa 3 mm. lata extus hirsuta intus glabra. Petala spathulata 6 mm. longa 2 mm. lata  $\pm$  obliqua apice triangulari-obtusa medio deorsum  $\frac{2}{3}$  mm. lata attenuata utraque glabra. Labellum valde concavum late rotundatum 5 mm. longum apice longe caudatum, caudis linearibus  $1\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice desuper recurvis vel convolutis, extus glabrum intus breve glanduloso-hirsutum. Columna 3 mm. longa apice 1 mm. lata basi angustior. Rostellum triangulare 1 mm. longum  $1\frac{1}{2}$  mm. latum; anthera oblongo-triangularis  $1\frac{2}{3}$  mm. longa  $1\frac{1}{3}$  mm. lata.



Fig. 59, *Goodyera caudatilabella* HAYATA.

HAB. Ius. Okinawa, leg. Y. TASHIRO, 1887, Mart. fl.

Near *G. procera*; but differs from it by the short rostellum and long caudate lips.

**Goodyera cyrtoglossa** HAYATA sp. nov. (Fig. 60) Caulis 80-100 cm. longus inferiore 7 mm. latus deorsum vaginatus medio foliatus sursum racemosus, partibus foliatis 20 cm. longis. Folia oblonga vel oblongo-lanceolata 15 cm. longa 5 cm. lata apice acuminata basi acuminata ad petiolum abeuntia in exsiccato submembranacea, petiolis 7-8 cm. longis basi dilatatis vaginatis, vaginis 1-2 cm. longis 13 mm. latis, partibus inter partem floriferam et racemosam squamiferis, squamis lanceolatis 3 cm. longis 1 cm. latis eulem amplectantibus, partibus floriferis 15 cm. longis, rhachibus dense brevique pilosis, bracteis lanceolatis 1 cm. longis 2 mm. latis apice lineari-acuminatis, pedicellis subnullis, ovariis 1 cm. longis dense brevique pilosis, pilis brevibus crispatis. Sepalum posticum ovato-lanceolatum 7 mm. longum  $2\frac{1}{2}$  mm. latum extus breve hirsutum intus glabrum subtrinervium, nervis lateralibus tenuissimis; sepala lateralialia quam postico paullo longiora et latiora  $\pm$  obliqua. Petala spathulato-lineararia 9 mm. longa 1 mm. lata apice obtusa vel rotundata medio deorsum attenuata basi  $\frac{1}{3}$  mm. lata. Labellum late rotundatum apice caudatum, parte

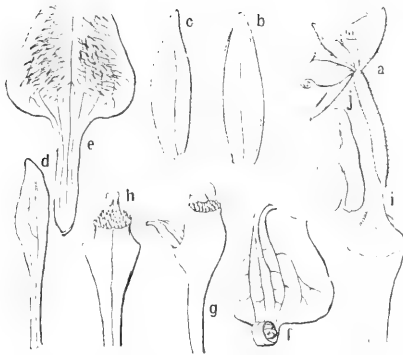


Fig. 60, *Goodyera cyrtoglossa* HAYATA; a, a flower; b, an uppermost sepal; c, a lateral sepal; d, a petal; e, a lip; f, the same, seen from back; g, a column, seen from side; h, the same, seen from front; i, the same, seen from back, anthers taken off, showing clinandrium; j, an anther, seen from front.

rotundata valde concava 3 mm. longa  $3\frac{1}{2}$  mm. lata, parte caudata lineari  $2\frac{1}{2}$  mm. longa  $\frac{1}{2}$  mm. lata apice interiore desuper convoluta. Columna 4 mm. longa  $\frac{1}{2}$  mm. lata apice dilatata  $1\frac{1}{2}$  mm. lata; rostellum triangulare  $1\frac{1}{2}$  mm. longum 1 mm. latum apice 2-aristato-lobatum; anthera ovato-oblonga 2 mm. longa 1 mm. lata.

HAB. Kappanzan, leg. U. MORI et Y. SHIMADA, Mart. 1910, (fl.).

Near *G. procera*, but differs by the long curled tails

at the apex of the lips, and by much smaller flowers.

***Goodyera longibracteata* HAYATA sp. nov.** (Fig 61, a-h). Caulis 50 cm. longus basi vaginatus deorsum infra medium foliatus. Folia oblique ovato-oblonga vel obovato-oblonga 12 cm. longa  $5\frac{1}{2}$  mm. lata apice breve acuminata ad summum breve aristata basi subito attenuata ad petiolum abeuntia, petiolis (cum vaginis) 6 cm. longis subplicatis basi dilatatis ad vaginam (partem dilatatam) abeuntibus, vaginis 3 cm. longis 8 mm. latis nervosis; caulis partes foliosæ 10 cm. longæ; partes floriferæ 14 cm. longæ; partes inter partem floriferam et foliatam 18 cm. longæ squamatae, squamis 3 cm. longis lineari-lanceolatis caulem amplectantibus. Racemi laxè vel denseque floriferi, bracteis lineari-lanceolatis 15 mm. longis 3 mm. latis apice acuminatis florem superantibus, rhachibus et ovariis brevissime puberulis, ovariis (pseudopedicellis) 8 mm. longis linearibus. Sepalum posticum elongato-oblongum  $7\frac{1}{2}$  mm. longum  $2\frac{1}{2}$  mm. latum apice obtusum basi leviter contractum  $1\frac{1}{2}$  mm. latum margine sursum apiceque interiore recurvum 3-nervium dorso breve hirsutum facie glabrum, lateralia cum postico æquiformia sed  $\pm$  obliqua latiora 3 mm. lata. Petala spathulato-linearia 7 mm.

longa  $1\frac{1}{2}$  mm. lata apice obtusa medio deorsum cuneato-attenuata basi  $\frac{1}{3}$  mm. lata 1-nervia. Labellum cuspidato-rotundatum 6 mm. longum explicato  $5\frac{1}{2}$  mm. latum apice caudatum, (cauda lineari-oblonga 2 mm. longa  $1\frac{1}{3}$  mm. lata apice obtusa basi contracta plana antice recurva), sub cauda usque ad basin ventricosum, ventriculo 4 mm. longo  $2\frac{1}{2}$  mm. lato extus glabro intus piloso (pilis  $\frac{2}{3}$  mm. longis) crasso ad marginem membranaceo. Columna (exceptis antheris et rostellis) 3 mm. longa; rostellum profunde 2-lobum, lobis lineari-triangularibus 2 mm. longis  $\frac{1}{2}$  mm. latis;

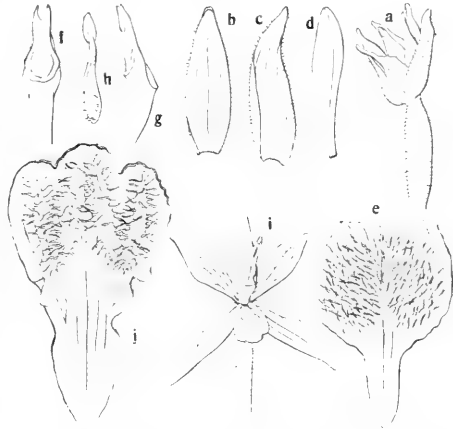


Fig. 61, *Goodyera longibracteata* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip, expanded; f, a column, seen from front; g, the same, seen from side; h, pollinarium; i-j, *Goodyera longirostrata* HAYATA; i, a flower, sepals and petals, expanded; j, a lip, expanded.

anthera triangulari-lanceolata 3 mm. longa  $1\frac{1}{2}$  mm. lata apice acuminata.

HAB. Kusususu, leg. Y. TASHIRO, 1913, Jan. fl.

Very near *G. cyrtoglossa* HAYATA; but differs from it by the shorter tail at the apex of the lips and erect rostellum. In *G. cyrtoglossa* HAYATA, the rostellum is always curved forwards at the apex. Also near *G. foliosa* BENTH. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. VIII. t, 374), but differs from it by the much narrower lanceolate petals.

***Goodyera longirostrata* HAYATA sp. nov.** (Fig. 61, i-j). Caulis basi repens ad nodos radicans, radicibus semper solitariis, internodiis 2-3 cm. longis ad nodos reliquis foliorum instructis, a basi sursum erectus 20 cm.

altus, basi foliatus sursum racemosus. Folia ovato-oblonga  $6\frac{1}{2}$  cm. longa 3 cm. lata apice acuta basi rotundata subito ad petiolum abeuntia margine integra in exsiccatō membranacea, petiolis 4 cm. longis basi dilatatis vaginiformibus caulem complete amplexantibus, partibus dilatatis 2 cm. longis. Racemi pauciflori, rhachibus dense molleque hirsutis, bracteis angustato-oblongis 3-nerviis 2 cm. longis 6 mm. latis apice acuminatis margine ciliolatis, floribus sessilibus, ovariis  $1\frac{1}{2}$  cm. longis. Sepala subæqualia angustato-oblonga  $1\frac{1}{2}$  cm. longa 6 mm. lata apice acuta 3-nervia utraque facie glabra, posticum cum petalis galeam formans. Petala cuneato-oblancoolata  $1\frac{1}{2}$  cm. longa 6 mm. lata apice triangulari-acuta basi cuneato-attenuata  $\pm$  obliqua 1-nervia, venis lateralibus obscuris. Labellum basi  $\pm$  saccatum explicato ovatum  $1\frac{1}{2}$  cm. longum 8 mm. latum apice late cuspidato-acutum, sacco intus dense piloso, (pilis longiusculis plus 1 mm. longis apice glanduliferis), multinervium. Columna brevis 2 mm. longa. Rostellum lineare 7 mm. longum 2-partitum, partibus linearibus 6 mm. longis 1 mm. latis apice acuminatis. Pollinia cuneato-linearia 9 mm. longa.

HAB. Akōchō: Buisan, ad 7000 ped. alt., leg. S. SASAKI.

**Goodyera morrisonicola** HAYATA (Tab. XVII.) Mater. Fl. Formos. p. 343. Caulis basi inferne radicans superne ascendens 10 cm. longus, tota longitudine foliatus. Folia alterna petiolata ovata vel ovato-oblonga 3 cm. longa  $1\frac{1}{2}$  cm. lata apice acuta basi rotundata margine minute crispata 3-5 nervia, petiolis  $1\frac{1}{2}$  cm. longis a medio deorsum dilatatis caulem amplexantibus. Scapi terminales 4 cm. longi laxè florati pubescentes, bracteis lanceolatis acuminatis 1 cm. longis basi 4 mm. latis florem subamplexantibus. Sepala subæqualia libera, posticum erectum concavum oblongo-angustatum 1 cm. longum  $3\frac{1}{2}$  mm. latum apice obtusum cum petalis angustis in galeam connivens, lateralibus libera erecta. Petala oblonga 11 mm. longa 3 mm. lata apice obtusa basi attenuata. Labellum ad basin columnæ sessile plicato-incurvo-ascendens 8 mm. in longitudine basi subsaccatum, (sacco intus villosa apice recurvo-obtusum), margine integrum, apice dentibus lateralibus brevibus. Columna brevis 1 mm. longa apice longe 2-cornuta, cornibus  $3\frac{1}{2}$  mm. longis. Anthera erecta ovato-lanceolata  $3\frac{1}{2}$  mm. longa apice attenuata acuminata. Capsula recta oblonga erostrata 1 cm. longa 4 mm. lata.



HAB. In monte Morrison, ad 6500 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 2323).

Near *G. Henryi* ROLFE., but the leaves of the present plant are narrower, acuter, and the bracts are more acuminate.

**Goodyera pachyglossa** HAYATA sp. nov. Caulis 25 cm. longus basi 3-4 cm. in diametro deorsum glaber sursum breve hirsutus tota longitudine foliatus. Folia alterna 3 cm. a se remota oblique ovato-oblonga 5 cm. longa 2 cm. lata apice obtusa ad summum minute obscureque mucronata basi rotundata subito ad petiolum abeuntia margine subintegra vel obscure minuteque crispata, petiolis 2 cm. longis basi dilatatis vaginiformibus, partibus vaginiformibus 1 cm. longis. Racemi (vel partes floriferæ caulis) 5 cm. longi dense floriferi, rhachibus breve hirsutis, bracteis lanceolatis 12 mm. longis 3 mm. latis glabris, ovariis 9-10 mm. longis hirsutis 3-nerviis. Sepalum posticum valde concavum ovato-oblongum 8 mm. longum 3-4 mm. latum apice obtusum basi  $\pm$  contractum  $1\frac{1}{2}$  mm. latum 3-nervium extus  $\pm$  hirsutum intus glabrum, lateralia oblique ovata 8 mm. longa 4 mm. lata apice obtusa 3-nervia extus hirsuta intus glabra. Petala rhomboideo-obovato-cuneata  $8\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata apice triangulari-obtusa basi cuneato-attenuata 1-nervia margine sursum subundulato-crispata. Labellum ovatum 7 mm. longum basi ventricosum, ventriculo 3 mm. longo totiusque lato extus glabro intus dense hirsuto, pilis complanatis 1 mm. longis, valde crassum ad margine tenuissimum membranaceum. Columna 1 mm. longa. Rostellum 2-partitum, partibus linearibus 3 mm. longis. Anthera elongato-ovata 3 mm. lata.

HAB. Rinkihō, 5000 ped. alt., leg. H. INABA, 1911, Aug. (fl. rosacei).

Near *G. morrisonicola* HAY., but differs from it by the much thicker lips, larger leaves, and by the longer stems.

***Cryptostylis* R. Br.**

***Cryptostylis erythroglossa*** HAYATA sp. nov. (Tab. XVIII.) Radices incrassate. Folia 2 crassiuscula in exsiccato membranacea elliptico-ovata vel elliptica 10 cm. longa 5 cm. lata apice obtusa basi obtuso-contracta subtus pallidiuscula, petiolis 3 cm. longis subplicatis. Scapi 7 cm. longi, floribus racemosim dispositis, bracteis lanceolatis 7-10 mm. longis acuminatis. Sepala aequalia linearia 13 mm. longa 2 mm. lata margine interiore plicata viridia

apice acuminata. Petala viridia linearia 9 mm. longa 1 mm. lata margine duplicatim vel singulariter plicata apice acuminata patentia. Labellum superius oblongo-ovatum vel lanceolato-ovatum 13 mm. longum 5 mm. latum rubrum apice acuminatum basi rotundatum basi breve saccatum, (sacco ore triangulari 2 mm. longo  $1\frac{1}{2}$  mm. lato) multinerviū supra minute denseque puberulum. Columna brevissima 1 mm. longa; appendiculæ clinandrii (stamino-dia) 2 pulviniformes.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. B. HAYATA, Jan., 1912.

Near *Cryp. filiformis* (BLUME Fl. Jav. Orchid. Vol. I. t. 45, fig. 3).

***Nervilia* GAUD.**

***Nervilia purpurea*** (HAYATA) (Tab. XIX.) Mater. Fl. Formos. p. 345. Herba terrestris; caulis foliatus brevissimus bulbosus, scapis floriferis aphyllis vaginatis. Folia cordata 5 cm. longa 6 cm. lata apice rotundata brevissime apiculata basi cordata ad sinus acuta margine integra supra breve setulosa subtus glabra, petiolis 2½ cm. longis. Scapi aphylli inferiore vaginati, (vaginæ 3 cm. longis apice rotundatis summum brevissime apiculatis), sursum 2-3 florati, bracteis oblanceolatis 1½ cm. longis 2 mm. latis. Sepala æqualia libera erecta spathulata 15 mm. longa 3 mm. lata apice breve acuta basi attenuata. Petala sepalis angustiora lineari-oblanceolata 14 mm. longa 2½ mm. lata apice breve acuta basi attenuata erecta. Labellum basi columnæ situm rectum liberum erectum obovatum obscure 3-lobatum 12 mm. longum 10 mm. latum apice rotundatum. Columna elongata 7 mm. longa apice clavata erecta.

HAB. Kōshūn: leg. T. KAWAKAMI, Juli. 1906, (No. 5150).

Near *Pogonia plicata* LINDL., but differs from it by the broader oblanceolate sepals and much narrower linear bracts.

***Nervilia yäyamensis*** HAYATA (Fig. 62) Ic. Pl. Formos. II. p. 140. Scapi aphylli 40-50 cm. longi inferiore ad nodos vaginati, internodiis 10 cm. longis, vaginæ 3 cm. longis ore obliquis, laminis obtusis, medio squamis singulis instructi, squamis amplexicaulibus elongatis 3 cm. longis acutis, partibus floriferis 10-15 cm. longis, bracteis lanceolatis, pedicellis (cum ovaris) 6-7 mm. longis, floribus horizontaliter patentibus vel nutantibus. Flores semipatentes, 23 mm. longi. Sepala subæqualia linearia, posticum 17 mm. longum 2½ mm.

latum apice acutum basi leviter attenuatum non contractum 3-nervium, lateralia vix latiora quam iis posticis 17 mm. longa 3 mm. lata 3-nervia apice acuta basi attenuata non contracta. Petala linearia 16 mm. longa 2 mm. lata apice acuta basi attenuata non contracta. Label-

lum ovatum 17 mm. longum 10 mm. latum apice 3-lobatum, lobis lateralibus acutis brevibus, lobo medio latiore ovato 6 mm. longo 5 mm. lato apice obtuso basi non contracto, basi trinervium, venulis lateralibus obliquis plurimis, supra barbato-

hirsutum. Columna semiteres 6 mm. longa apice plus minus clavata exalata. Pollinia 2 granulosa. Ovarium obovoideum  $3\frac{1}{2}$  mm. longum apice truncatum basi distincte constrictum prominente 2-costatum inter costas 1-costulatum.

HAB. Yäyama; Ishigakishima, Juli., 1910.

Near *Pogonia Scottii* REICHB. f. in Ann. Roy. Bot. Gard. Calc. VIII. t. 360; but differs by the barbate lips with obtusely contracted base.

### *Didymoplexis* GRIFF.

***Didymoplexis subcampanulata* HAYATA** (Fig. 63) Ic. Pl. Formos. II. p. 136. Herba tenuis aphylla, rhizomatibus tuberiferis, tuberibus fusiformibus  $1\frac{1}{2}$  cm. longis 6-7 mm. latis moniliforme 2-3 continuis. Scapi erecti 5-6 cm. longi teretes inferiore 1-2-nodosi, ad nodos squamis unis instructi, squamis fissis vel integris 4 mm. longis triangularibus, partibus floriferis  $2\frac{1}{2}$  cm. longis, superiore sub floribus singulis 1-bracteatis, bracteis late triangularibus apice obtusis basi latissimis  $2\frac{1}{2}$  mm. longis 3 mm. latis. Flores spicati inferiore

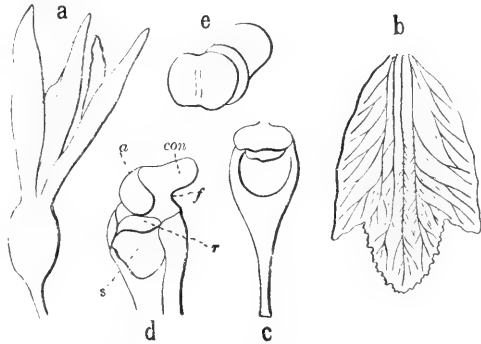


Fig. 62, *Nervilia yajamensis* HAYATA; a, a flower; b, a lip; c, a column, seen from front; d, the same, seen from side; e, anther; r=rostellum, s=stigma, c=clinandrium, a=anther, con=connective, f=filament.

3 mm. a se remoti superiore plus dense dispositi subcampanulatum patentes 1 cm. longi 5 mm. lati, pedicellis cum ovariis 12 mm. longis. Sepala: posticum elongato-oblongum 1 cm. longum 4 mm. latum apice rotundatum, inferiore cum

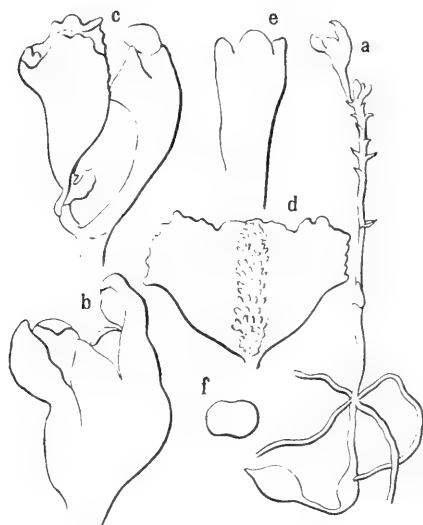


Fig. 63, *Dilmplexis subcampanulata* HAYATA; a, the plant; b, a flower, seen from side; c, the same, sepals and petals taken off; d, lamina of the lip; e, apical portion of a column; f, pollinia, very soft; fig. a, natural size.

petalis connatum, lateralia postico æquilonga se latere inferiore a basi usque ad medio connata superiore libera apice rotundata. Petala cum sepalo postico subsimilia sed breviora. Labellum late cuneato-triangulari 5 mm. longum ad apicem truncatum 6 mm. latum apice erosum basi breve unguiculatum, unguibus  $\frac{1}{2}$  mm. longis, apice unguium 1-appendiculatum, appendiculis lamellatis erectis latissimis, medio 3-seriatim cristato-tuberculatum, tuberculis lamelli-formibus. Columna 5 mm. longa apice alata basi exalata. Capsula oblonga utrinque contracta 17 mm. longa 8 mm. lata 6-

valvatim dehiscens, valvis ad utraque extremitatem unitis 3 latioribus 3 angustioribus, extus parce minute tuberculata. Semina minutissima filiformi-linearia  $1\frac{1}{4}$  mm. longa.

HAB. Kōshūn, leg. T. KAWAKAMI, Mart., 1910, et B. HAYATA Aug., 1912.

Near *D. pallens* GRIFF., but differs from it by nearly campanulate flowers with obtriangular lips. *D. pallens* GRIFF. figured in Ann. Roy. Bot. Gard. Cale. V. t. 346 has rather tubular flowers with cuneate oblong lips. The description of capsules above given is drawn up from another specimen which was doubtfully referred to *D. pallens* by myself in my Materials for a Flora

of Formosa p. 347. The type specimen, with several duplicates, was first collected by Mr. T. KAWAKAMI at Kōshūn. The plant was also found by myself in my excursion to the island in the beginning of July, 1912, on the sandy ground in a clump of shrubs near the sea-shore on the eastern coast of the south cape.

*Galera* BLUME.

**Galera kusukusensis** HAYATA sp. nov. (Tab. XX.) Terrestriis aphylla laticolor tuberifera. Tuber oblongo-ovoideum horizontaliter situm vel ascendens 1-2 cm. longum 8 mm. in diametro subnudum apice scapum singulum gerens. Scapi circ. 30 cm. longi basi squamis verticillatis instructi a basi sursum squamis remotis alternis instructi, squamis ovatis 1 cm. longis basi semi-amplexicaulibus apice acutis, partibus floriferis 10 cm. longis, floribus 1-2½ cm. a se remotis, bracteis linearibus vel lanceolatis circ. 1 cm. longis, pedicellis 5 mm. longis subnutantibus, ovariis globosis 5 mm. in diametro. Sepala et petala semiclausa non patentia. Sepala subæqualia linearia 10 mm. longa 1 mm. lata apice acuminata basi non contracta. Petala lanceolata 10 mm. longa quam sepalis latiora 1½ mm. lata apice acuminata basi non contracta. Labellum valde concavum erectum oblongum 10 mm. longum in explicato 8 mm. latum apice triangulari-obtusum margine undulato-crispatum supra purpureo-maculatum, maculis 4, sursum muricato-tuberculatum basi ad calcar 3½ mm. longum productum. Columna brevissima. *Epipogon kusukusense* HAYATA in sched. herb. Taihoku.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, 1912, Juli.

Near *Galera Rolfei* HAYATA (= *Epipogon Rolfei* HAY.); but differs from it by the longer lips which are undulately crispate at the margin, and by the much narrower petals.

**Galera Rolfei** HAYATA (Fig. 64) Mater. Fl. Formos. p. 348. Tuber solitarium 3 cm. longum 12 mm. latum elongato-ellipticum apice obtusum carnosum horizontaliter situm. Scapus circ. 35 cm. longus incrassatus erectus rectus basi ascendens teres brunneus inferne squamis distantibus amplexicaulibus obtusis tenuissimis membranaceis instructus, superne florifer, bracteis alternis erecto-patentibus lineari-lanceolatis acuminatis membranaceis circ. 1 cm. longis uni-florem amplexantibus. Flores in pedicellis filiformibus cernui aut tandem

penduli scapo concolores. Sepala æquiformia angustata erecta 7 mm. longa 1 mm. lata obtuso-acuminata integra parcissime punctata, lateralibus plus minus obliquis. Petala sepalo latiora 7 mm. longa 2 mm. lata acuminata. Labellum sessile concavum gynostemium amplexans, ima in calcar breve obtusum 3 mm.

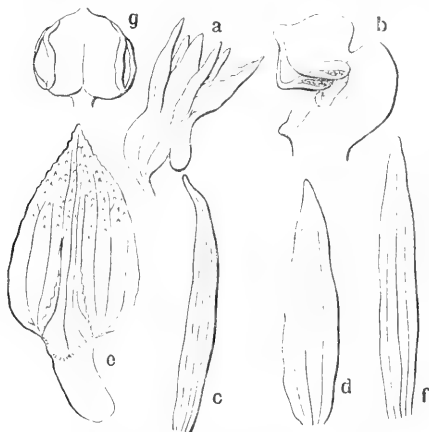


Fig. 64, *Galera Rolfei* HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column; g, an anther.

longum rectum productum, limbo ovato obtuso 9 mm. longo erecto ad marginem subintegro vel sub lente minutissime eroso intus papilloso infra apicem parcissime papilloso. Gynostemium brevissimum crassum obtusissimum 2 mm. longum dorso rotundato-convexum. Ovarium obovoideum sulcatum, pedicello 4 mm. longo.

*Epipogon Rolfei* HAYATA  
in sched. herb. Tōkyō.

HAB. Okinawa, leg. S. TANAKA, 1891, Mai. (No. 147).

The present plant is near *G. nutans*, but differs from it in having shorter spurs, and in the lips which are nearly obtuse at the apex, nearly entire on the margin, and very much less papillose on the upper surface.

### *Platanthera* RICH.

***Platanthera longibracteata* HAYATA sp. nov.** Caulis 30–40 cm. longus basi vaginatus, (vaginis 4 cm. longis apice obtusis), infra medium 1–2–3-foliatus medio squamatus, partibus squamatis 10 cm. longis, sursum florifer, partibus floriferis 10 cm. longis. Folia spatulata vel ovato-oblongata apice obtusa 16 cm. longa 3 cm. lata apice obtusa deorsum gradatim angustata ad vaginam 1½ cm. longam abeuntia exsiccatō membranacea. Racemi laxo florati glabri, floribus a se 1 cm. remotis, bracteis lanceolatis 1½ cm. longis acuminatis, floribus sessilibus, ovariis vel fructibus 6–7 mm. longis ellipsoideis apice rostratis

3 mm. latis. Sepalum posticum triangulari-oblongum  $2\frac{1}{2}$  mm. longum  $1\frac{1}{2}$  mm. latum apice obtusum basi  $\pm$  dilatatum 3-nerviū, lateralia oblonga  $\cup$ -formiter recurva 4 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusa basi angustata 1 mm. lata 3-nervia. Petala triangulari-oblonga 3 mm. longa 1 mm. lata 1-nervia apice acuta basi haud contracta. Labellum lineare 6 mm. longum  $\frac{1}{2}$  mm. latum apice obtusum facie longitudinaliter rugosum basi calcaratum, calcar lineari 1 cm. longo  $\frac{1}{2}$  mm. lato utraque extremitate angustato apice obtuso. Columna brevissima.

HAB. Mt. Morrison, ad 8500 ped. alt., leg. S. SASAKI.

**Platanthera pachyglossa** HAYATA sp. nov. (Tab. XXI.) Caulis 30 cm. longus erectus glaber angulosus basi vaginatus deorsum foliatus sursum racemosus. Folia ovato-oblonga vel oblongo-lanceolata 6 cm. longa  $1\frac{1}{2}$  cm. lata apice acuta ad summum obtusa basi obtusa ad basin plus minus decurrentia caulem semi-amplectantia. Racemi 10 cm. longi, floribus a se 1–2 cm. remotis, bracteis florem vix superantibus lanceolatis, pedicellis circ. 0 vel brevissimis, ovariis circ. 1 cm. longis linearibus. Sepalum posticum rotundatum vel ovato-rotundatum 5 mm. longum  $4\frac{1}{2}$  mm. latum apice obtusum basi leviter truncate-cordato-contractum ad insertionem 2 mm. latum, lateralia lineari-lanceolata 7 mm. longa  $2-2\frac{1}{2}$  mm. lata  $\sim$ -formiter recurva margine extime recurva apice acuto-obtusa basi non contracta. Petala valde oblique late rotundata longe cuspidata cum cuspidibus 5 mm. longa 4 mm. lata, cuspidibus linearibus 3 mm. longis apice obtusis 1 mm. latis. Labellum lineari-lanceolatum crassiusculum rectum 9 mm. longum 2 mm. latum. Columna lata brevis.

HAB. Formosa: loco non indicato.

**Platanthera stenoglossa** HAYATA sp. nov. Caulis 40 cm. longus infra medium 1-foliatus medio sursum squamatus, squamis ovato-lanceolatis lanceolatis vel lineari-lanceolatis 1–3 cm. longis. Pars caulis florifera 10 cm. longa glabra, bracteis acuminato-ovatis vel ovato-lanceolatis 15–13 mm. longis  $3\frac{1}{2}$  mm. latis 3-nerviis. Sepalum posticum oblongum  $4\frac{1}{2}$  mm. longum 2 mm. latum apice obtusum basi contractum 1-nerviū, lateralia linearia postico angustiora 6 mm. longa  $\sim$ -formiter recurva  $\frac{2}{3}$  mm. lata 1-nervia apice obtusa. Petala obliqua cuspidato-ovata  $4\frac{1}{2}$  mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi valde oblique rotundata. Labellum lineare angustatum 5 mm. longum  $\frac{2}{3}$  mm.

latum apice obtusum crassiusculum basi calcaratum, calcar lineari 6 mm. longo 1- $\frac{2}{3}$  mm. lato antice leviter recurvo. Columna (cum anthera) 3 mm. longa totiusque lata.

HAB. Shichiseitonzan, leg. T. KAWAKAMI et Y. SHIMADA Juli, 1910.

Remarkable for having narrower lateral sepals than the dorsal one.

**Platanthera truncatolabellata** HAYATA sp. nov. (Fig. 65). Caulis erectus gracilis minute brevissime hirtellatus 35 cm. longus ad totam

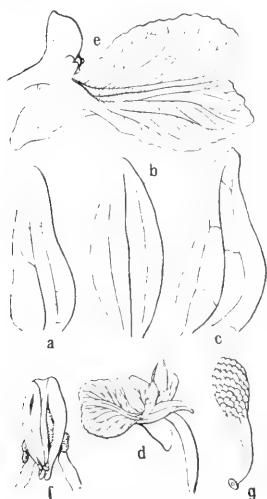


Fig. 65, *Platanthera truncatolabellata* HAYATA; d, a flower; b, a dorsal sepal; c, a lateral sepal; a, a petal; e, a lip; f, column; g, a pollinarium.

longitudinem foliatus superne florifer. Folia alterna sessilia oblonga 3 cm. longa 12 mm. lata apice rotundato-acuta basi in vaginam brevem contracta amplexicaulia, vaginis 3 mm. longis. Flores ad axillas foliorum superiorum solitarii vel racemosi, racemis 10 cm. longis. Flores mediocres 1 $\frac{1}{2}$  cm. in diametro. Sepala inaequalia erecto-patentia, posticum oblongo-angustatum 8 $\frac{1}{2}$  mm. longum 2 $\frac{3}{4}$  mm. latum apice rotundato-acutum, lateralia latiora ovata 8 mm. longa 3 mm. lata apice attenuato-obtusa basi rotundata valde obliqua latere labelli connata. Petala ovato-oblonga 7 mm. longa 2 mm. lata basi obliqua ad basin columnæ connata apice attenuato-obliqua. Labellum 13 mm. longum unguiculatum, unguis basi columnæ connatus in calcar productus, calcar latissimo 5 mm. longo, ore 4 mm. in diametro, lamina obovato-rotundata 1 cm. longa 8 mm. lata apice emarginata margine crispa prope medium parce 3-lamellata, lamellis brevissime hirtellatis.

Columna 2 mm. longa.

*Platanthera obcordata* HAYATA (non LINDL.) in Materials for a Flora of Formosa p. 351.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. MORI, Juli, 1907, (No. 3482).



Near *P. obcordata* (Oreh. Western Himalayas in Ann. Roy. Bot. Gard. Calc. IX. p. 144); but differs from it by the quite truncate or emarginate lips.

**Platanthera** sp. (Fig. 66.) Terrestis; Tuber suberectum cylindricum 1 cm. longum. Caulis 20 cm. longus gracilis erectus deorsum supra basin 2-3-foliatus sursum racemosus, partibus inter floriferas et foliatis 8 cm. longis remote squamatis, squamis 5 mm. longis linearibus. Folia oblonga vel ovato-oblonga  $3\frac{1}{2}$  cm. longa 1 cm. lata apice obtusa vel acuta ad summum breve aristata vel obtusa basi caulem amplectantia ad vaginam 5 mm. longam abeuntia. Racemi (partes floriferæ) 8 cm. longa glabra, floribus a se 5-10 mm. remotis, bracteis ovato-lanceolatis 5 mm. longis  $1\frac{1}{2}$  mm. latis glabris. Sepalum posticum ovato-oblongum 3 mm. longum  $1\frac{1}{2}$  mm. latum apice truncato-obtusum basi leviter contractum  $\frac{2}{3}$  mm. latum 1-nervium margine interiore leviter recurvum, lateralia postico angustiora 3 mm. longa 1 mm. lata oblique lineari-oblonga apice obtusa basi obliqua non contracta 1-nervia margine interiore recurva. Petala sepalo postico conformia sed minora. Labellum profunde cruciforme 3-lobum, lobis basilaribus lineari-filiformibus a lobo terminali angulo  $90^\circ$  divaricatis 4 mm. longis  $\frac{1}{10}$  mm. latis recurvis, lobo terminali lineari 2 mm. longo  $\frac{1}{2}$ - $\frac{1}{3}$  mm. lato apice obtuso recto, basi calcaratum, calcar spatulato-lineari 4 mm. longo sursum dilatato  $\frac{2}{3}$  mm. lato apice obtuso basi angustato subrecto. Columna brevissima; anthera  $\frac{2}{3}$  mm. lata.

HAB. Kappanzan, leg. W. R. PRICE, Juli. 1912.

This interesting tiny orchid was collected by Mr. W. R. PRICE in July, 1912, in an open country among dense *Miscanthus* in Mt. Kappanzan. It is somewhat near *Habenaria aristata* Hook. f. (in Orchids of the Sikkim Himalayas

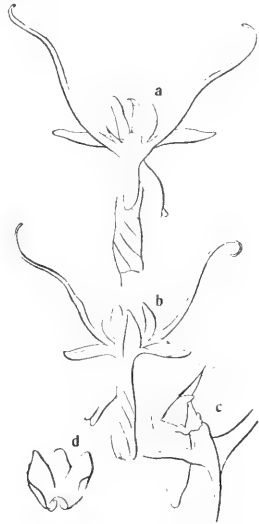


Fig. 66, *Platanthera* sp.; a, a flower; b, the same, seen from back; c, central part of the same; d, a column, with a dorsal sepal and petals.

in Ann. Roy. Bot. Gard. VIII. t. 409), but differs from it in having much smaller form and very much more divaricate filiform basal lobes of the lips. I should propose to call this orchid *Platanthera Pricei*, if it proves to be new species of the named genus, or I should rather entirely leave it to Mr. PRICE to name this orchid, as this is one of Mr. PRICE's collections. It lacks in the collections of my own.

***Habenaria* WILLD.**

***Habenaria goodyeroides* DON var. *formosana* HAYATA n. v.** (Tab. XXII.) Caulis elongatus 60 cm. longus glaber, partibus inferioribus aphyllis, intermediis foliis congestis, superioribus aphyllis floriferis, partibus aphyllis infra folia congesta 25 cm. longis vaginatis, vaginis 5 cm. longis remote sitis ore leviter dilatatis apice truncatis, partibus foliatis 7 mm. longis 5-6-foliatis. Folia oblonga 13 cm. longa 5 cm. lata apice obtusa acuta basi contracta in vaginam amplexicaulem attenuata, vaginis  $2\frac{1}{2}$  cm. longis, squamis superne minoribus ovato-lanceolatis 2 cm. longis. Spicæ elongatæ 15 cm. longæ dense floratæ, bracteis ovato-lanceolatis 13 mm. longis apice aristato-acuminatis, floribus minoribus. Sepala inæqualia subpatentia, posticum ovatum  $4\frac{1}{2}$  mm. longum 3 mm. latum apice obtusum, lateralia angustiora basi obliqua cum petalis adnata apice dorso breve apiculata. Petala sepalo latiora late oblonga  $4\frac{1}{2}$  mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi valde oblique labello connata. Labellum liguliforme 5 mm. longum 4 mm. latum apice dilatatum 3-lobatum, (lobo medio latissimo triangulari 3 mm. longo totiusque lato apice obtuso, lobis lateralibus angustioribus), basi calcaratum, calcar 2 mm. longo ore contracto  $1\frac{1}{2}$  mm. lato; discus basi 2-lamellatus, a medio sursum 1-lamellatus; staminodia 2 mm. longa angustata.

*Platanthera goodyeroides* var. *formosana* HAYATA = *Habenaria goodyeroides* HAYATA (non DON.) Mater. Fl. Formos. p. 353.

Differs from the type by the narrower leaves and lamellate discs.

***Habenaria linearipetala* HAYATA sp. nov.** (Tab. XXIII.) Caulis circ. 50 cm. longus deorsum vaginatus, medio approximativ foliatus sursum racemosus. Folia medio caulis approximativ sita obovato-oblanccolata 18 cm. longa 4 cm. lata apice acuminata basi attenuata basi vaginata, vaginis 2 cm. longis caulem amplexantibus, in exsiccatō membranacea. Racemi 10 cm. longi

dense floriferi, bracteis lanceolatis  $1\frac{1}{2}$  cm. longis apice acuminatis basi attenuatis, pedicellis fere 0, ovariis linearibus vel ovatis circ. 1 cm. longis. Sepalum posticum ovato-lanceolatum circ. 1 cm. longum apice filiforme acuminatum medio  $2\frac{1}{2}$  mm. latum basi leviter contractum concavum 3-nervium, lateralia postico conformia vix latiora 3 mm. lata plus minus obliqua. Petala linearia 9 mm. longa  $\frac{1}{2}$  mm. lata apice acuminata basi dilatata. Labellum 3-partitum, parte centrali lineari longissima circ. 10 mm. longa  $\frac{1}{2}$  mm. lata, partibus lateralibus linearibus centrali brevioribus 5 mm. longis angustissimis  $\frac{1}{3}$  mm. latis apice acuminatis, basi calcaratum, calcari 13 mm. longo 1 mm. lato lineari antice leviter recurvo. Anthera  $1\frac{1}{2}$  mm. longa erecta 2-brachiata, brachiis divaricatis, staminodiis claviformibus  $\frac{1}{2}$  mm. longis. Rostellum  $\lambda$ -forme 2-brachiatum, brachiis divaricatis  $1\frac{1}{2}$  mm. longis apice se approximatis descendentibus; stigma 2-partitum, partibus distincte separatis linearibus complanato-teretibus  $1\frac{1}{2}$  mm. longis.

HAB. Mt. Morrison, ad 8500 ped. alt. leg. S. SASAKI, 1909, Oct.

Near *Habenaria astenopetala* LINDL. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. VIII. t. 404), in having linear petals and linear 3-lobed lips; but differs from it by the long tailed sepals and much narrowly based leaves.

**Habenaria longitentaculata** HAYATA sp. nov. (Tab. XXIV.) Caulis erectus 55 cm. longus basi 8 mm. in diametro glaber inferiore vaginatus, vaginis cylindricis 3 cm. longis 8 mm. latis ore obliquis a se  $4\frac{1}{2}$  cm. remotis, medio foliatus, foliis approximatis, sursum squamatus, squamis ovatis a se  $3\frac{1}{2}$  cm. remotis 2 cm. longis caulem amplexantibus, sursum florifer, partibus floriferis 10 cm. longis. Folia ad medium caulis approximata alterna oblango-oboata vel ovata 12 cm. longa 5 cm. lata apice breve cuspidato-acuta basi cuneato-attenuata ad vaginam abeuntia, venis primariis parallelis, secundariis transversis manifeste reticulatis. Racemi 10 cm. longi remote florati, floribus a se 2-3 cm. remotis, bracteis ovatis acuminatis 18 mm. longis 6-7 mm. latis. Perianthia patentia, sepalum posticum galeæforme valde concavum 1 cm. longum 6 mm. latum apice acutum basi contractum 3-nervium; sepala lateralia postico conformia sed valde obliqua. Petala profunde 2-loba vel 2-partita, partibus angulo  $180^\circ$  se divaricatis linearibus 1 cm. longis basi

1 mm. latis sursum teretibus. Labellum tripartitum, partibus linearibus, parte centrali 11 mm. longa  $\frac{1}{2}$  mm. lata, lateralibus centrali brevioribus 6 mm. longis a centrali angulo  $45^\circ$  divaricatis, basi calcaratum, calcari 12 mm. longo antice recurvo ore 3 mm. in diametro. Rostellum  $\lambda$ -forme 2-brachiatum, brachiis 2 mm. longis. Anthera  $\triangle$ -formia 2-brachiata, brachiis divaricatis rostello parallelis; staminodia claviformia; stigmata 2-partita, partibus lineari-fusiformibus  $4\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis paralleliter se remotis.

HAB. Nantüchö, in montibus, leg. U. MORI, 1909.

Near *H. ciliaris* KRÄNZL, but differs from it by the quite glabrous scapes and biparted petals, portions of which are divaricated at  $180^\circ$ . Also near *Habenaria stenopetala* LINDL. var. *polytricha* HOOK. f. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. VIII. t. 404, bis) in having long linear petals attaching at their centres to the apex of the ovary, and long linear 3-lobed lips; but differs altogether from it in the leaves, bracts and not tailed sepals.

**Habenaria tohoensis** HAYATA sp. nov. (Fig. 67). Caulis 40–50 cm.

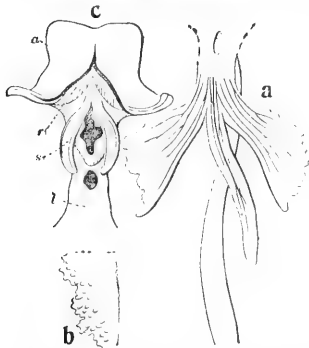


Fig. 67, *Habenaria tohoensis* HAYATA; a, a lip; b, marginal portion of the same; c, central portion of a flower; a=anther, r=rostellum, s=stigma, l=lip.

longus basi vaginatus supra basin foliatus a medio sursum squamatus, vaginis cylindraceis 6 cm. longis, squamis ovato-lanceolatis 2–3 cm. longis apice acuminatis vel lineari-acuminatis, versus apicem flores 2–3-gerens toto glaber. Folia obovato-oblonga vel elliptico-oblonga 11 cm. longa 3 cm. lata apice acuta basi cuneato-angustata ad summum tenuiter aristata. Flores apertientes  $2\frac{1}{2}$  cm. in diametro, bracteis lineari-lanceolatis 2 cm. longis 4 mm. latis 3-nerviis apice lineari-acuminatis,

subsessiles, ovariis 2 cm. longis 3 mm. latis ovato-fusiformi-linearibus apice longe rostratis basi contractis glabris. Sepalum posticum oblongo-ovatum 1 cm. longum 4–5 mm. latum 5-nerviium apice obtusum basi  $\pm$  contractum, lateralia

oblique ovata 11 mm. longa  $5\frac{1}{2}$ –6 mm. lata apice acuminata  $\sim$ -formiter sensim recurva basi valde contracta basi rotundata 7-nervia margine integra. Petala lanceolata 11 mm. longa 2 mm. lata apice acuminata 1-nervia. Labellum  $\wedge$ -forme 16 mm. longum totiusque latum basi subito cuneato-contractum basi  $1\frac{1}{2}$  mm. latum alte 3-lobum, lobis lateralibus (basilaribus) semi-rotundatis unilateralibus 1 cm. longis  $\frac{1}{2}$  cm. latis apice acutis vel acuminatis margine interiore rectis margine exteriori  $\cap$ -formibus basi cuneatis margine exteriori sursum irregulariter denticulatis multinerviis, lobo terminali (centrali) lineari-lanceolato 12 mm. longo 2 mm. lato apice obtuso basi haud contracto medio congesto-multinervio, sinibus inter lobos laterales et lobum terminalem acutis, calcar longissimo 4 cm. longo  $1\frac{1}{2}$  mm. lato apice obtuso subrecto. Columna brevissima.

HAB. Tôhozan, ad 6500 ped. alt., leg. S. SASAKI, Oct. 1909.

Near *H. Miersiana* CHAMP., but differs from it by the not fimbriate lobes of the lip. Also near *H. geniculata* DOX (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Cal. VIII. t. 405), but differs by the much longer central lobes of the lips.

### *Hemipilia* LINDL.

***Hemipilia formosana*** HAYATA (Tab. XXV.) Mater. Fl. Formos. p. 354.

## Selaginellaceæ.

### *Selaginella* SPRING.

***Selaginella stenostachya*** HAYATA sp. nov. (Fig. 68) Caulis cum spicis 8 cm. longus glaber pluri-sulcatus paucè remoteque foliosus. Folia a se  $1\frac{1}{2}$  mm. remota, dorsalibus minoribus ovatis  $1\frac{1}{4}$  mm. longis  $\frac{1}{2}$  mm. latis apice cuspidato-acutis basi leviter contractis margine minute aristato-serrulatis, ventralibus majoribus  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis ovatis apice obtusissimis basi truncato-rotundatis margine minute aristato-serrulatis. Spicæ versus apicem ramorum racemosim dispositæ simplices erectæ rectæ tenuiter tetragonocylindraceæ 7–8 mm. longæ cum bracteis 2 mm. latæ, bracteis radiatis 4-seriatim dispositis imbricatis interdum subpatentibus, dorsalibus ventrali æqualibus rotundato-ovatis 1 mm. longis  $\frac{2}{3}$  mm. latis apice cuspidato-acutis basi



Fig. 68, *Selaginella stenostachya* HAYATA;  
a, a ventral leaf; b, a dorsal leaf; c, a portion  
of a spike; d, a bract seen from side.

rotundatis ad extremitatem auriculis  $\frac{1}{8}$  mm. longis singulis instructis, margine minute setuloso-serrulatis tenuibus. *Selaginella leptophylla* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 553 (non BAKER).

HAB. Shinkōchō, leg. T. KAWAKAMI.

Very near *S. leptophylla* BAKER, but differs from it by the much narrower spikes.

## Lycopodiaceæ.

### *Lycopodium* LINN.

***Lycopodium* (*Lepidotis*) *alpinum* LINN. var. *transmorrisonense* HAYATA n. v.** (Fig. 69) Caulis repens teres  $1\frac{1}{2}$  mm. in diametro sectionis ramosissimus, ramis ascenditibus dense foliosis apice interdum ad stipitem spicarum abeuntibus. Folia imbricatum spiraliter disposita adpressa vel  $\pm$  patentia ascendenti-recurva triangulari-lanceolata 3 mm. longa apice acuminata basi latissima minus 1 mm. lata crassa margine integra 1-nervia  $\pm$  complanata intus plana dorso rotundata in sectione plano-convexa margine obtusa. Spicæ cylindricæ  $2\frac{1}{2}$  cm. longæ 3-4 mm. in diametro sectionis, bracteis firme imbricatis densiuscule spiraliter sitis sub sporangio singulis caudato-ovatis apice caudato-acutis basi 1-auriculatis cum auriculis 4 mm. longis  $2\frac{1}{2}$  mm. latis margine irregulariter denticulatis, auriculis oblongo-triangularibus 1 mm. longis minus 1 mm. latis apice obtusis, utraque pagine glabris 1-nerviis, nervis dorso haud intus distincte

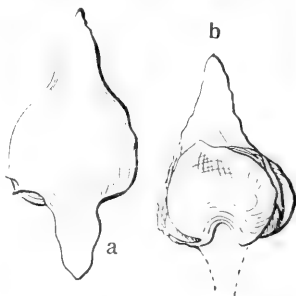


Fig. 69, *Lycopodium alpinum* var. *transmorrisonense* HAYATA, a, a bract seen from back; b, the same seen from face.

visis. Sporangium reniforme latius quam longius apice late rotundatum basi late sinuatum minus 2 mm. latum. Spicere simplices ad apicem ramorum solitarie erectæ longe stipitatae, stipitibus 3 cm. longis simplicibus erectis rectis subremote foliosis, foliis spiraliter laxiuscule dispositis firme adpressis lineari-lanceolatis 3-4 mm. longis  $1\frac{1}{2}$  mm. latis intus concavis extus convexis 1-nerviis utraque glabris margine integris vel irregulariter obscure denticulatis crassiusculis.

HAB. in montibus centralibus, leg. U. MORI, 1908, Dec.

Differs from the type (HOOK. Brit. Fer. t. 53) and its variety *nikoense* by the long and distinctly peduncled solitary spikes.

**Lycopodium carinatum** DESV.; MATSUM. et HAYATA Enum. Pl. Formos. p. 554.

HAB. Kōshūn: KURATA, leg. S. SASAKI, 1911, Dec.

**Lycopodium cunninghamioides** HAYATA sp. nov. Caulis pendulus dense spiraliter subdistiche foliosus cum foliis 3 cm. latus cum spicis 50 cm. longus. Folia acuminato-linearia vel acuminato-lanceolata 16 mm. longa apice aceroso-acuminata  $2\frac{1}{2}$  mm. lata basi leviter angustiora ad insertionem  $1\frac{1}{2}$  mm. lata margine integerrima leviter carinata 1-nervia, nervis supra planis versus apicem carinato-elevatis subtus planis, supra viridia subtus pallidiora, foliis dorsalibus basi plus minus tortuosis, ventralibus basi non tortuosis. Caulis versus apicem gradatim ad spicem abeuns, foliis caulinis superioribus gradatim minoribus ad bracteas spicarum abeuntibus. Spicæ 7-8 cm. longæ 17 mm. latæ, bracteis lineari-lanceolatis 11 mm. longis basi latissimis 2 mm. latis apice acuminatis basi rotundatis 1-nerviis margine integris supra basin ad 3 mm. tortuosis, nervis utraque pagine planis non-carinatis. Sporangia cordato-reniformia  $1\frac{2}{3}$  mm. lata  $1\frac{1}{2}$  mm. longa apice rotundata basi cordata, sinu cordis acuto.

HAB. Urai, leg. T. SŌMA, Juni. 1910, (No. 1).

Near *L. squarrosum* FORST.

**Lycopodium formosanum** W. HERTER, HAYATA Mater. Fl. Formos. p. 412.

HAB. Taitō: Manchōsha, leg. G. NAKAHARA, Jan., 1906, (No. 6).

I remember that I saw the type of the species at Kew herbarium. From my memory, I think the present plant here enumerated is identical with the type.

**Lycopodium juniperistachyum** HAYATA sp. nov. *Lycopodium pinifolium* HAYATA Mater. Fl. Formos. p. 412 (non BLUME) pro parte. Radices basi caulis ramosæ. Caulis pendulus cum spicis 25 cm. longus tota longitudine multisulcatus vel striatus densiuscule foliosus cum foliis 13–15 mm. latus. Folia spiraliter subdistiche subdorsiventraliter disposita lanceolata 11 mm. longa 2 mm. lata apice acuminata basi plus minus angustiora ad basin 1¼ mm. lata margine integra, (dorsalibus basi tortuosis, ventralibus non tortuosis), utraque glabra crasso-membranacea 1-nervia, nervis supra planis subtus distincte elevatis visis, subtus pagine plus minus pallidiora supra viridia nitida. Spicæ 8–13 cm. longæ terminales simplices vel 1–2-plo dichotome ramosæ cum bracteis 7–8 mm. latæ, bracteis spiraliter radialiter densiuscule dispositis cuspidato-lanceolatis 8 mm. longis apice lineari-acuminatis basi latissimis 1½ mm. latis rotundatis ad insertionem plus minus constrictis ⅔ mm. latis 1-nerviis, nervis intus planis extus (dorso) carinato-elevatis, margine integris basi non tortuosis. Sporangium ad axillas bractearum solitarium cordato-reniforme 1½ mm. latum 1¼ mm. longum latius quam longius apice rotundatum basi profunde cordatum, sinu cordis acuto.

HAB. Taitō: Manchōsha, leg. G. NAKAHARA, Jan., 1906, (No. 787).

*Lycopodium taxifolium* HAYATA Mater. Fl. Formos. p. 412 pro parte, (non Sw.)

Near *Lycopodium taxifolium* Sw; but differs from it by the linear narrower bracts. This specimen is exactly the same as a specimen from the Philippines which is labelled as *Lycopodium pinifolium* BLUME. Somewhat near *L. nitens* SCH. (KUNZE Farnkräut. I. t. 80), but differs from it by the broader leaves.

**Lycopodium pulcherrimum** WALL. (HOOK. et GREV. Ic. Fil. t. 38).

HAB. monte Morrison, ad 8000 ped. alt., leg. T. KAWAKAMI et U. MORI, Oct., 1907, (No. 1783); Arisan, ad 8000–7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *L. cryptomerinum* MAX., but differs from it by the thinner leaves of much softer texture.

**Lycopodium Selago** LINN.

HAB. in montibus centralibus, ad 11000 ped. alt., leg. U. MORI, 1908, Dec.



Compared with a Japanese specimen so labelled in the herbarium at Tōkyō.

**Lycopodium serratum** TH. var. **myriophyllifolium** HAYATA n. v. Terrestre; caulis suberectus basi plus minus ascendens tota longitudine densiuscule foliosus teres  $1\frac{1}{2}$  mm. in diametro. Folia linearia 12 mm. longa  $1\frac{1}{2}$  mm. lata apice acuminata basi haud angustiora margine crispata undulata irregulariter serrulata, serrulis longioribus 1 mm. longis acutis ascendentibus, utraque pagina glabra 1-nervia, nervis supra (intus) elevatis subtus (extus) planis non distinctis. Sporangium ad axillas foliorum solitarium lunulato-reniforme  $1\frac{1}{4}$  mm. longum 1 mm. latum 2-valvatum brevissime stipitatum vel subsessile.

HAB. in monte Arisan, leg. U. MORI, 1908, Mart. (No. 6208).

Differs from the type by the much narrower linear leaves with sharp toothed and crispate margin.

**Lycopodium squarrosus** FORST in MATSUM. et HAYATA Enum. Pl. Formos. p. 555.

HAB. Taitō: Botansha, leg. G. NAKAHARA, Jan. 1906, (No. 789); Biōritsu, leg. S. NAGASAWA, Dec., 1906.

**Lycopodium subdistichum** MAKINO; HAYATA Mater. Fl. Formos. p. 412.

*Lycopodium pinifolium* HAYATA Mater. Fl. Formos. p. 412 pro parte, (non BLUME).

*Lycopodium taxifolium* HAYATA Mater. Fl. Formos. p. 412. pro parte, (non Sw).

HAB. Kōshūn: Botanrosha, Jan., 1906 (No. 791); Wantan, leg. T. KAWAKAMI, 1904; Arisan, leg. B. HAYATA, Jan., 1912.

**Lycopodium tereticaule** HAYATA (Fig. 70), Mater. Fl. Formos. p. 411. Descriptio auctata: Epiphyta densissime caespitosa. Caulis teres filiformis pendulus sursum sorifer, partibus soriferis non distinctis filiformibus in longitudine variabilibus cum bracteis  $1\frac{1}{2}$  mm. in diametro sectionis, bracteis spiraliter plus minus imbricatim sitis late cuspidato-rotundatis  $1\frac{1}{4}$  mm. longis 1 mm. latis apice cuspidato-acutis basi leviter contractis crassiusculis intus planis dorso carinatis, (carinis deorsum decurrentibus), margine subintegris. Sporangium

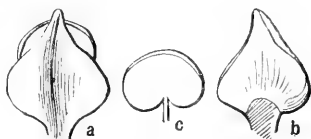


Fig. 70, *Lycopodium tereticaule* HAYATA; a, a bract, seen from back; b, the same, seen from face, sporangium taken off; c, a sporangium.

ad axillas bractearum solitarium late cordatum reniforme 1 mm. latum  $\frac{1}{2}$  mm. longum apice rotundatum basi cordatum gracillime stipitatum, stipite tenuissimo  $\frac{1}{2}$  mm. vel  $\frac{1}{3}$  mm. longo.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et SASAKI, 1912, Jan.

## Ophioglossaceæ.

### *Botrychium* Sw.

***Botrychium leptostachyum*** HAYATA sp. nov. (Fig. 71). Rhizoma? Stipes 14 cm. longus teres basi dilatatus toto glaber. Frons late triangularis

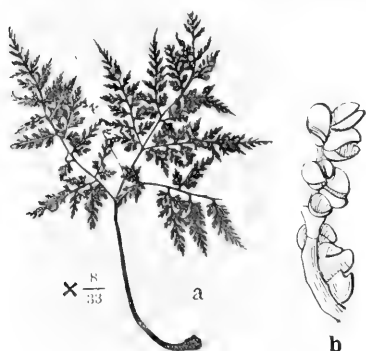


Fig. 71, *Botrychium leptostachyum* HAYATA; a, the plant; b, a portion of the spike; a =  $\times \frac{8}{33}$ , b, magnified.

16 cm. longa 26 cm. lata digitato-tripartita, parte terminali paniculam sporangiorum gerenti, eas laterales in longitudine æquanti; partibus lateralibus ovatis plus minus obliquis cum petiolis 16 cm. longis 9 cm. latis bipinnatifidis, (petiolis 2 cm. longis), apice acuminatis basi in ambitu cordatis, pinnis infimis (latere inferiore) longissimis 5-6 cm. longis oblique triangularibus basi 5-6 cm. latis, pinnulis infimis (latere inferiore) longissimis  $3\frac{1}{2}$  cm. longis oblongis

basi 2 cm. longis pinnatifidis, segmentis ovatis apice in ambitu obtusis basi late cuneatis inciso-lobatis, lobis acutis. Textura tenuissima herbacea, venulis terminalibus simplicibus vel furcatis distincte visis tenuissimis, rhachibus frondium subcomplanatis superiore subalatis, rhachibus pinnarum et pinnularum alatis cum alis 2 mm. latis. Pars frondis terminalis iis lateralibus æquilonga longe petiolata, (petiolo  $4\frac{1}{2}$  cm. longo medio paniculam sporangiorum gerenti), æqualiter latissime rhomboidea cum petiolo 16 cm. longa totiusque lata bipinnatifida, pinnis infimis triangulari-lanceolatis apice acuminatissimis 10 cm. longis 4 cm. latis, pinnulis infimis sessilibus oblongis 3 cm. longis  $1\frac{1}{2}$  cm. latis. Panicula sporangiorum tenuissima e medio petioli partis terminalis

frondis oriunda cum pedunculo 7 cm. longa  $1\frac{1}{2}$  cm. lata, (pedunculis  $2\frac{1}{2}$  cm. longis) recta, ramis panicularum 8 mm. longis oppositis angulo recto divaricatis sporangia spicatum gerentibus. Sporangia sessilia subglobosa basi latissima 2-valvata toto glabra.

HAB. Nōkōsan. leg. U. MORI, Jan., 1903, (No. 6291).

Near *B. virginianum* Sw. (EAT. Fern. North America t. 33), but differs from it by the more loosely arranged lobes of the pinnules, lobes of which are much more larger than those of *B. virginianum*, and by the much shorter panicles which are on the petioles of the terminal partitions of the fronds.

### Osmundaceæ.

#### *Osmunda* LINN.

##### *Osmunda regalis* LINN. var.?

HAB. Tonkurankei, leg. U. MORI, 1910, Aprili.

No fertile frond. Sterile one is a little different from the type. It may be a variety of the same.

### Hymenophyllaceæ.

#### *Trichomanes* SM.

##### *Trichomanes acuto-obtusum* HAYATA sp. nov.

(Fig. 72). Rhizoma repens filiforme. Stipes subnullus vel brevissimus vel usque 5 mm. longus. Frons cordato-ovata oblonga vel lanceolata variabilissima usque 2 cm. longa usque  $1\frac{1}{2}$  cm. lata apice rotundata vel obtusa pinnatifida vel bipinnatifida, pinnis vel pinnulis lobatis, lobis ultimis oblongo-linearibus 2-3 mm. longis  $1\frac{1}{2}$  mm. latis apice obtuso-acutis ad summum acutis, rhachibus frondium  $1\frac{1}{2}$  mm. latis; frons sursum sorifera; margine plus minus vel haud undulata plus minus desuper recurva, costis utraque pagine

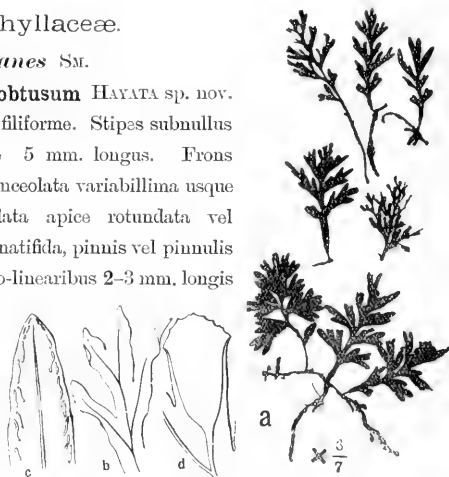


Fig. 72. *Trichomanes acuto-obtusum* HAYATA; a, the plant; b, a portion of a pinna; c, a portion of the same, showing the vermiform strings; d, a sorus.

elevatis; pagine supra pilis unicellularibus glandulosis brevissimis paucè dispersa subtus subglabrata. Involucrum ad basin pinnarum situm vel ad lobos inferiores pinnarum situm subascendens infundibulo-campanulatum  $1\frac{1}{2}$  mm. longum ad orem plus 1 mm. longum apice late rotundatum 2-valvatum, valvis brevibus plus 1 mm. latis minus  $\frac{1}{2}$  mm. longis margine erosodenticulatis.

HAB. Bonin, leg. Sôma.

Near *T. nanum*, but differs from it by the longer lobes and obtuse receptacles; from *T. filicolum*, differs by the more acute lobes. Also near *T. Kurzii* (BEDD. Fern. Brit. Ind. t. 286), but separable from it by the short obtuse valves of the involucres.

***Trichomanes cupressifolium* HAYATA** sp. nov. (Fig. 73). Rhizoma

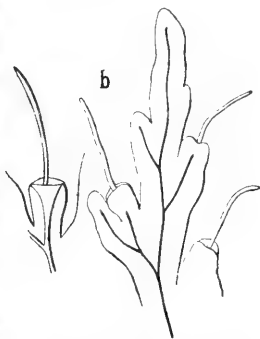


Fig. 73, *Trichomanes cupressifolium* HAYATA; a, the plant; b, a portion of the frond.

repens filiforme ferrugineo-pilosum remote foliosum. Stipes cum fronde perpendiculariter pendulus filiformis 15–17 mm. longus subglaber fusco-nigricans. Frons usque 9 cm. longa usque 3 cm. lata ovato-lanceolata vel lanceolata oblongo-lanceolata apice attenuata vel angustata ad summum obtusa basi acuta vel acuto-truncata versus basin pinnata medio pinnatifida, pinnis alternis inferioribus longioribus, infimis brevioribus, superioribus gradatim breviori-

bus versus summum ad lobum simplicem reductis, pinnis inferioribus longissimis 15 mm. longis 6 mm. latis ovato-lanceolatis ad apicem obtusis basi

cuneatis pinnatilobis, lobis utroque latere 4-5 latere superiore plus numerosis latere inferiore minus numerosis oblongo-triangularibus, lobis mediis longissimis 2 mm. longis 1 mm. latis apice obtusissimis alternis, pinnis infimis brevioribus 1 cm. longis circ. unilateralibus vel valde obliquis, pinnis mediis a rhachibus frondium angulo  $45^{\circ}$  egressis. Rhachis frondis sursum 2 mm. lata; rhachis pinnæ inferioris 2 mm. lata. Frons supra medium usque ad prope apicem sorifera, pinnis singulis generaliter latere superiore sorum singulorum gerentibus, vel interdum utroque latere sorum singulorum vel soros duos gerentibus. Involuerum infundibulo-campanulatum  $2\frac{1}{4}$  mm. longum ore  $1\frac{1}{2}$  mm. latum utroque latere alatum, alis circ.  $\frac{1}{4}$  mm. longis, ore truncato-rotundato, valvis subnullis, iis inferioribus quam superioribus paullo longioribus margine integris. Frons utraque pagine glabra margine integra leviter obscure vel haud crispato-undulata vel plus minus desuper recurva vel haud recurva, costis venis venulis utraque pagine elevatis; cellulae vermiformes desunt.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Trichomanes humile* FORST. (HOOK. et GREV. Ic. Fil. t. 85); but differs from it in having lobes on both sides of the pinnæ. Found in a dry place under a large crag in Mt. Tōzan.

***Trichomanes fliculum*** BORY (Fig. 74); MATSUM. et HAYATA Enum. Pl. Formos. p. 564.

*Trichomanes bipunctatum* POIR.; MATSUM. et HAYATA l.c. p. 564.

HAB. Kōtō-shō, leg. T. KAWAKAMI et S. SASAKI, Juli., 1912, (No. 18).

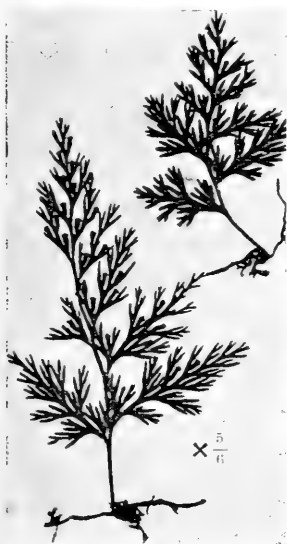


Fig. 74, *Trichomanes fliculum* BORY.



Fig. 73, *Trichomanes humile* FORST

**Trichomanes humile** FORST. (Fig. 75); MATSUM. et HAYATA Enum. Pl. Formos. p. 565.

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli., 1912, (No. 21).

**Trichomanes maximum** BLUME (Fig. 76); *Trichomanes thysanostomum* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 568 (non MAKINO).

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912, (No. 16 et 20).

Compared with a specimen so named from the Philippines.

**Trichomanes orientale** C. CH. (Fig. 77). *Trichomanes japonicum* FR. et SAV. Enum. Pl. Jap. II. p. 207.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI; Rinkihō, leg. H. INABA, Aug. 1910.

**Trichomanes palmifolium** HAYATA sp. nov. (Fig. 78). Rhi-

Fig. 76, *Trichomanes maximum* BLUME.

*zoma repens* filiforme breve pubescens nigricans remote radicans remote foliosum. Stipes 2-7 mm. longus basi nigricans glaber filiformis. Frons in ambitu cordato-ovata vel rotundato-ovata 14 mm. longa totiusque



Fig. 77, *Trichomanes orientale* C. CH.; a, the plant; b, a portion of the frond.

lata pinnatiloba, lobis utroque latere 2-3, rhachibus 2 mm. latis, lobis obtriangulari-obcuneatis 5 mm. longis 4 mm. latis apice in ambitu truncatis basi cuneatis apice alte duplo vel triplo lobulatis,

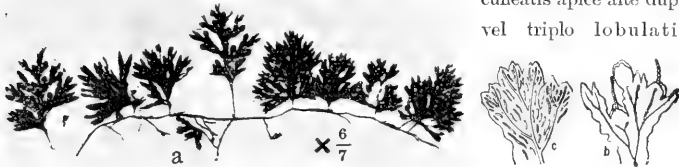


Fig. 78, *Trichomanes palmifolium* HAYATA; a, the plant; b, a portion of a frond; c, another portion of a frond, showing the vermiform strings on the latter.

lobulis ultimis 1-2 mm. longis 1-1½ mm. latis apice acutis margine leviter superiore (sursum) recurvis crispato-undulatis; frons leviter recurva vel suberecta, costis frondis loborum vel lobulorum utraque pagine elevatis, utraque pagine pilis brevissimis pauce (præsertim ad costas) dispersis brevissimis apice clavatis. Involuerum ad lobulum lateralem terminale apice valvis 2 semirotundatis 1½ mm. latis ⅔ mm. longis instructum basi complanatum campanulatum, campanulis ore 1¼ mm. latis 1 mm. altis (profundis), valvis ventralibus quam iis dorsalibus paullo majoribus.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.



Fig. 79, *Trichomanes rigidum* Sw.

Near *T. Makinoi* C. CH. = *T. acutum* MAKINO (Phanerog. et Pterid. I. t. 16), but differs from it by the shorter and broader fronds; from *T. proliferum*

(BEDD. Fern. South Ind. t. 262) by the much acuter lobes of the pinnae. Also near *T. latemargia* de EATON (HK. BK. Syn. Fil. p. 79) in the general form, but I could not satisfactorily identify our fern with it.

**Trichomanes rigidum** Sw.; (Fig. 79) MATSUM. et HAYATA Enum. Pl. Formos. p. 568.

HAB. Hieranzan, leg. B. HAYATA et S. SASAKI, Juli., 1912.

*Hymenophyllum*  
LINN.

**Hymenophyllum constrictum** HAYATA sp. nov. (Fig. 80). Rhizoma repens teres gracillimum  $\frac{1}{2}$  mm. in diametro sectionis remote radicans, radicibus pilis longioribus dense obtectis. Stipes erectus gracilis 8-9 cm. longus teres  $\frac{3}{8}$  mm. in diametro ad basin vel ad apicem virgæ dense pilosus, pilis nigro-castaneis suberispis vel rectis 1-seriatim multice-



Fig. 80, *Hymenophyllum constrictum* HAYATA; a, the plant; b, a hair at the base of the frond; c, a portion of a pinna.

llularibus 1-3 mm. longis. Frons triangulari-ovata 10 cm. longa totiusque lata apice acuta basi in ambitu subcordata bipinnata tri-quadi-pinnatifida, pinnis



ordinis I. mediis ovato-triangularibus a se 1 cm. remotis a rhachibus frondis 50°-60° egressis 5 cm. longis 3 cm. latis, pinnis ordinis II. infimis ab axilla inter frondem et pinnam infimam ordinis I. 5 mm. distantibus ovatis 2 cm. longis 1½ cm. latis apice obtusis basi oblique truncatis pinnatis vel bipinnatifidis, segmentis ultimis linearibus ¼ mm. latis apice obtusis vel brevissime 2-lobatis vel soro terminatis, sub soro valde constrictis, partibus constrictis ¼ mm. latis ½ mm. longis stipitiformibus. Frons pagine utraque glabra, costis venis venulisque utraque elevatis, margine integra; rhachis frondis deorsum interrupte angustissime alata sursum distincte alata; rhachis pinnarum distincte alata. Involuerum ad basin 2-valvatim fissum bivalvatum terminale rotundatum latius quam longius 1 mm. longum margine subintegrum vel obscure denticulatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1913.

Near *H. polyanthos*, but differs from it by the broadly round receptacles with short stalks.

**Hymenophyllum javanicum** SPRENG. (Fig. 81).

HAB. in monte Arisan, ad 7000-8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a Japanese specimen so labelled in the Tōkyō herbarium. Our fern looks to be a little different from it in having much broader lobes of the pinnae.

**Hymenophyllum parallelocarpum** HAYATA sp. nov. (Fig. 82). Rhizoma repens gracillimum ½ mm. in diametro sectionis teres rubescens piloso-squamatum, pilis nigro-castaneis, remote radicans, radicibus pilosis. Stipes cum fronde perpendiculariter pendulus 2-2½ cm. longus gracillimus atro-castaneus glaber basi piloso-squamatus, squamis piliformibus nigro-castaneis. Frons oblongo-lanceolata vel obovato-lanceolata

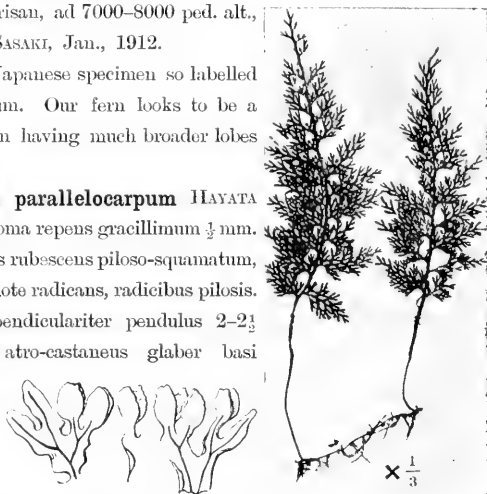


Fig. 81, *Hymenophyllum javanicum* SPRENG.

10 cm. longa 4 cm. lata apice obtuso-acuta basi in ambitu cuneato-acuta bipinnatifida, pinnis mediis longissimis a se 8 mm. remotis angulo  $45^{\circ}$ – $50^{\circ}$  a rhachibus egressis lineari-lanceolatis 3 cm. longis 12 mm. latis apice obtusis oblique cuneatis sessilibus, pinnulis vel segmentis linearibus inferioribus a se 3–4 mm.



Fig. 82, *Hymenophyllum parallelocarpum* HAYATA; a, the plant; b, a portion of a pinna.

remotis 6–7 mm. longis 2-lobatis vel simplicibus, lobis linearibus 2 mm. longis 1 mm. latis apice truncato-rotundatis vel leviter emarginatis vel apice soro terminatis, segmentis vel lobis sori-feris apice sub soro plus minus constrictis æquilatis cum involuero. Frons integra pallido-fusca utraque glabra, costis venis

utraque pagine distincte elevatis rubro-castaneis glabris; rhachis frondis alata medio cum alis 1 mm. lata vel latior. Involucrum late

rotundatum vel rotundato-semi-orbiculare basi truncatum haud constrictum minus 1 mm. latum margine integerrimum apice perfecte rotundatum minus 1 mm. longum latius quam longius glabrum usque ad basin 2-valvatim fissum.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *H. rarum* R. BR. (KUNZE Farnkräuter I. t. 96), but differs from it by the much more branched fronds. Also near *H. Wrightii* V. D. BOSCH, (MAKINO Phanerog. et Pterid. Vol. I. t. 17.), but separable from it by the more pinnatifid pinnæ.

### ***Hymenophyllum polyanthos* Sw.**

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a specimen so labelled in the Tōkyō herbarium. This fern seems to vary a very wide range.

## Polypodiaceæ.

### *Cystopteris* BERNHARD.

***Cystopteris formosana* HAYATA sp. nov.**  
(Fig. 83). Rhizoma repens  
4 mm. crassum radices dense  
emittens. Stipes tenuissi-  
mus 30 cm. longus inferiore

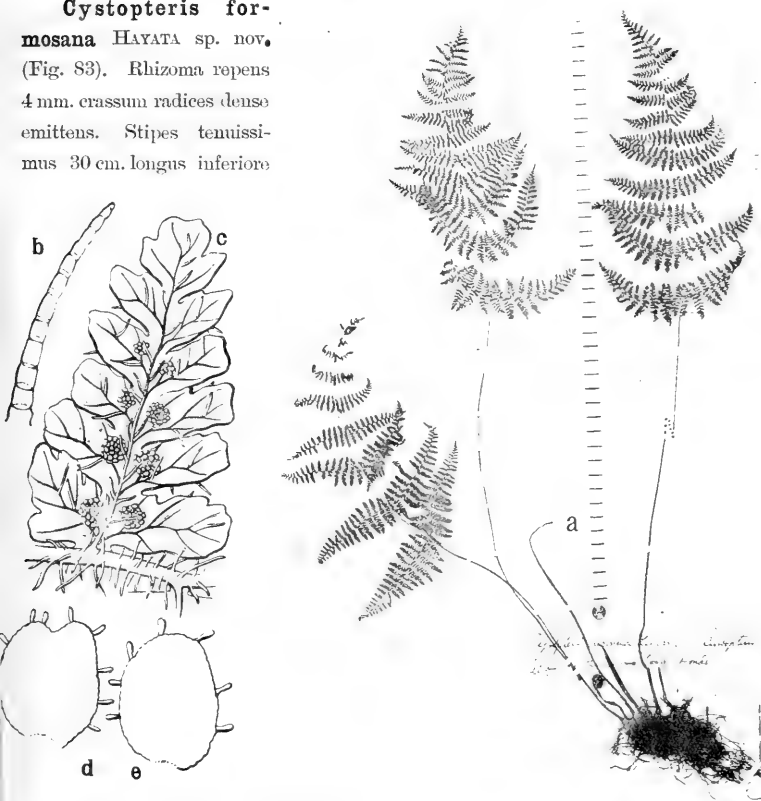


Fig. 83, *Cystopteris formosana* HAYATA; a, the plant b, a hair on the surface of the frond; c, a pinnule; d and e, indusia.

2 mm. in diametro teres basi castaneus sursum flavo-stramineus piloso-squamatus paucè pilosus basi dense sursum paucè squamatus, squamis mediis triangulari-lanceolatis, inferioribus triangulari-cuspidatis 5 mm. longis basi 2 mm. latis basi latissimis, superioribus minoribus tenuissimis margine glanduloso-ciliolatis, pilis tenuissimis multi-cellularibus. Frons ovato-lanceolata vel triangulari-lanceolata 22 cm. longa 10-12 cm. lata apice ambitu acuminata basi truncata vel rotundata bipinnata, pinnis inferioribus longioribus suboppositis a se 3 cm. remotis a rhachibus angulo 80°-90° divaricatis rectis vel  $\pm$  recurvis sessilibus lanceolatis 7 cm. longis 3 cm. latis apice acuminatis basi truncatis æquilateralibus, pinnulis inferioribus a rhachibus angulo recto divaricatis lineari-oblongis 18 mm. longis 7 mm. latis a se 7 mm. remotis apice obtusis basi truncato-acutis sessilibus pinnatifidis inferiore ad costam superiore prope costam filis, segmentis rectangularibus 4 mm. longis basi circ. 2 mm. latis apice truncatis margine lobulatis, lobulis apice rotundatis  $\frac{1}{2}$  mm. latis, segmentis superioribus brevioribus subintegris. Textura tenuissime herbacea; frons pallido-viridis, rhachibus frondium breve pilosis; costulae pinnularum supra leviter canaliculate utroque latere canaliculorum densiuscule pilosae supra elevatae; pagina frondis densiuscule pilosa, pilis articulatis multicellularibus, venis et venulis utraque pagine parce pilosis. Sori utroque latere costae pinnularum prope costam 1-seriatim dispositi globosi. Indusium oblongum margine remoto glanduloso-ciliolatum.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *C. japonica* LEURS., but differs from it by the more hairy fronds; still nearer *C. setosa* (BEDD.) (BEDD. Fern. Br. Ind. t. 312 and *Lastrea setosa* BEDD. Fern. Brit. Ind. t. 262), from which this differs by the oblong nearly orbicular indusium with glanduliferous margin and by the very much smaller fronds. Perhaps a smaller form of *C. setosa*.

**Cystopteris sphærocarpa** HAYATA sp. nov. (Fig. 84). Rhizoma. Stipes stramineus flexuosus 18 cm. longus basi parce squamatus nitidus, squamis ovato-oblongis vel ovatis 4 mm. longis  $1\frac{1}{2}$ -2 mm. latis apice acuminatis basi rotundatis tenuissimis fusco-purpurascens. Frons triangularis 12 cm. longa 10 cm. lata basi latissima apice tenuissime lineari-acuminatissima pinnata, pinnis inferioribus longioribus lanceolatis  $3\frac{1}{2}$  cm. longis a se  $1\frac{1}{2}$  cm. remotis



Fig. 84, *Cystopteris sphaerocarpa* HAYATA; a, the plant; b, a scale on the stipe; c, a pinnule; d, a sorus; e, an indusium.

a rhachibus frondium angulo  $90^{\circ}$  divaricatis, infimis valde longissimis lanceolatis  $5\frac{1}{2}$  cm. longis 23 mm. latis apice acutis ad summum obtusis basi truncatis plus minus angustioribus brevissime petiolatis, pinnulis inferioribus a se 18 mm. remotis oblique ovatis 12 mm. longis 7 mm. latis apice ambitu rotundatis basi late oblique cuneatis brevissime petiolulatis lobulatis, lobulis oblongis margine minute denticulatis, partibus cuneatis integris. Textura herbaceo-membranacea. Sori basi lobulorum singuli globosi. Indusium late rotundatum margine irregulariter erosum.

HAB. in monte Morrison, ad 11000 ped. alt., leg. T. KAWAKAMI et S. SASAKI, Oct., 1909.

Near *Cystopteris fragilis* BERNH., but differs from it by the broader, shorter fronds with more obtusely lobed pinnules. Also near *C. tenuis* (LOWE Brit. Exot. Fern. Vol. VII. p. 35) from which this differs by the triangular bipinnate fronds; from *C. moupinensis* (FRANCHET Pl. DAVID. II. p. 149), this is separable in the bipinnate (but not tripinnate) fronds.

*Dryopteris* ADANSON.

*Dryopteris* (*Ctenitis*) *angustodissecta*

HAYATA sp. nov. (Fig. 85). Rhizoma? Stipes 20 cm. longus ferrugineo-rubro-castaneus pubescens, pilis pluricellularibus rubescentibus, basi densiuscule sursum parce squamatus, squamis inferioribus ovato-lanceolatis 6-8 mm. longis 1-2 mm. latis. Fronselongato-triangulari-ovata 45 cm. longa basi latissima 22 cm. lata apice triangulari-acuminata basi acuto-truncata bipinnata vel tripinnatifida, pinnis inferioribus oppositis a se 5-6 cm. remotis angulo 80°-90° a rhachibus divaricatis,

infinis lanceolato-triangularibus 13-14 cm. longis basi 8-9 cm. latis apice acuminatis basi latissimis breve petiolatis (petiolis 8 mm. longis), pinnulis infimis latere inferiore praesertim longissimis 6 cm. longis 2 cm. latis lineari-lanceolatis apice acu-

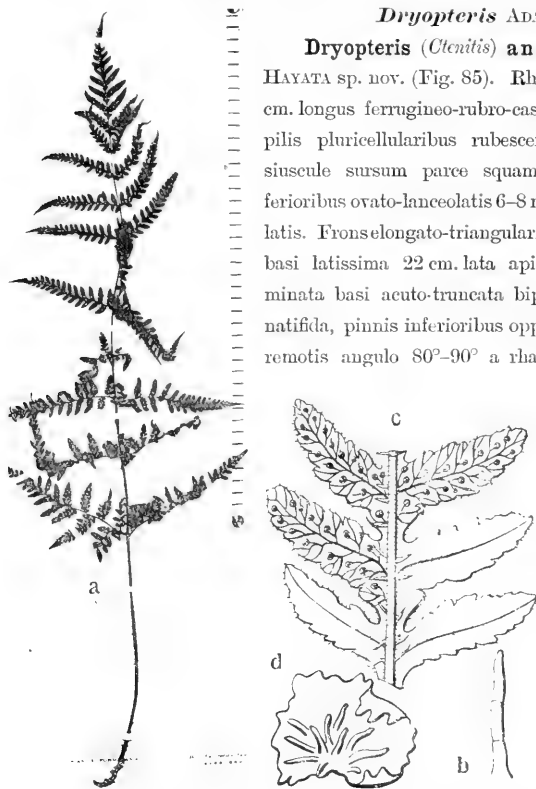


Fig. 85, *Dryopteris* (*Ctenitis*) *angustodissecta* HAYATA; a, the plant; b, a hair on the costa of a pinnule; c, a portion of a pinnule; d, an indusium.

minatis basi truncatis latissimis sessilibus basi pinnatis sursum pinnatifidis, pinnulis ordinis secundarii vel segmentis inferioribus ovato-triangularibus 1 cm. longis 7 mm. latis apice obtusis basi truncatis latissimis sessilibus vel breve petiolulatis margine lobulatis; frons basi usque ad summum sorifera herbacea supra pubescens subtus ad costam costulas venas venulasque tenuiter pubescens, pilis pluri-cellularibus. Sori utroque latere costulæ pinnularum vel segmentorum 1-seriatim dispositi. Indusium subreniforme ad centrum pilosum.

HAB. Kō-shūn: Kuraru, leg. B. HAYATA et S. SASAKI, Mai. 1912.

Near *D. dissecta* (DES.); but differs from it by the much narrower pinnæ and pinnules with narrower lobes.

**Dryopteris**  
(*Lastrea*) **apiciflora** (WALL.) O. KTZE. (Fig. 86);  
HOOK. Sp. Fil. VI. t. 248.

*Lastrea apiciflora* (HOOK.) BEDD. Fern. Brit. Ind. t. 40.

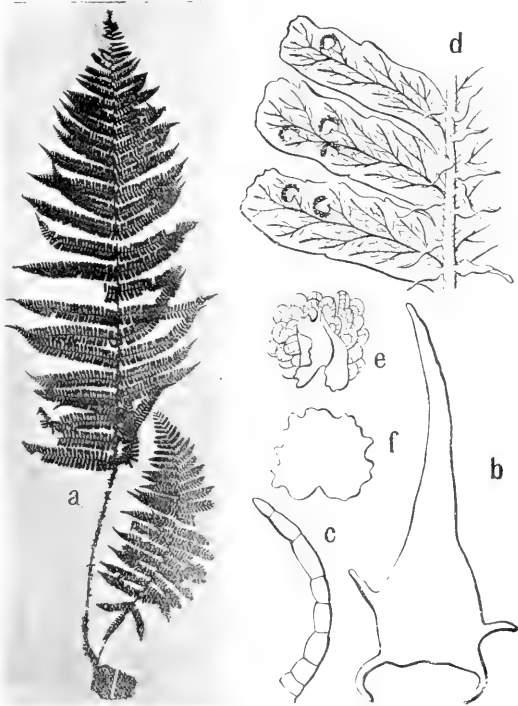


Fig. 86, *Dryopteris* (*Ctenitis*) *apiciflora*; a, the plant; b, a scale on the under surface of a costa of a pinna; c, a hair on the upper surface of a costa of a pinna; d, portion of a pinna; e, a sorus; f, an indusium.

HAB. Arisan, ad 7000-6000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.  
Epiphytica vel terrestris.



Fig 87, *Dryopteris (Lastrea) aurita* C. CH.; a, the plant; b, a scale on the rhizome; c, basal part of the same; d, basal part of a pinna.



Fig. 88-A, *Dryopteris crenata* C. CH.; a, the plant.

*Dryopteris (Lastrea) aurita* C. CHR. (Fig. 87) Ind. Fil. p. 253 (1905).



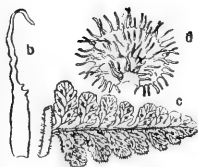


Fig. 88-B, *Dryopteris crenata* O. KTZE.; b, a scale at the base of the stipe; c, a pinule; d, an indusium.

*Nephrodium odoratum* BAKER Syn. p. 280.

HAB. Montibus centralibus, leg. U. MORI et S.

KATŌ, Dec. 1909.

It is rather doubtful that this is identical with *D. crenata*, for there is a little difference regarding the size of the stipes and the hairy state of the fronds. This slightly differs from the Japanese specimen labelled *N. odoratum* BAKER. The sori of our fern are much larger than those of the Japanese.

***Dryopteris* (*Eudryopteris*) *cyrtolepis* HAYATA**  
 sp. nov. (Fig. 89). Rhizoma? Stipes 27 cm. longus  
 basi 1 cm. in diametro cum rhachibus densiuscule squa-  
 matus, squamis variabilissimis lanceolatis usque filiformi-  
 bus basi densissime dispositis usque 2 cm. longis  
 castaneis. Frons in ambitu  
 lanceolata 100 cm. longa 30 cm.  
 lata apice subito acuminata basi  
 gradatim angusta ad basin 10 cm.  
 lata pinnata, pinnis linearibus  
 mediis longissimis 15 cm. longis  
 2 cm. latis a se 3 cm. remotis sub-  
 oppositis apice acuminatis basi  
 latissimis truncatis pinnatifidis  
 basi ad rhachin fissis sursum  
 prope rhachin fissis, segmentis

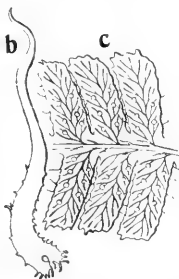


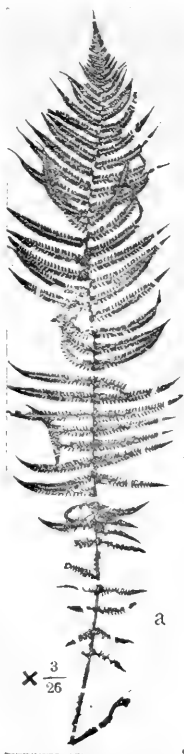
Fig. 89, *Dryopteris cyrtolepis* HAYATA; a, the plant; b, a scale on the frond-rhachis; c, portion of a pinna.

*Gymnogramme aurita* HOOK. Ic. t. 974. *Aspidium aurita* (HOOK.); MATSUM. et HAYATA Enum. Pl. Formos. p. 579.

HAB. Rahao, leg. T. SŌMA, 1910. Dec.

***Dryopteris* (*Eudryopteris*) *crenata* O. KTZE.**  
 (Fig. 88, A-B).

*Hypodematium Rüppellianum* KUNZE Farnk-räuter I. p. 41, t. 21 (1840).



inferioribus rectangularibus 1 cm. longis 5 mm. latis apice truncatis margineo biseure et remote serrulatis vel subintegris apice obscure denticulatis. Pinnæ medio deorsum a rhachibus frondis angulo recto divaricatæ apice plus minus falcato-ascendentes, inferioribus a se 3 cm. remotis brevioribus plus minus reflexis, infimis 6 cm. longis  $1\frac{1}{2}$  cm. latis, superioribus ascendentibus a rhachibus frondium  $50^{\circ}$ – $60^{\circ}$  divaricatis brevioribus a se approximatis, segmentis a costa pinnarum angulo  $80^{\circ}$  egressis. Costæ pinnæ supra leviter canaliculatæ squamis minutis obtectæ, subtus elevatæ squamis majoribus densiuscule obtectæ, costulis segmentorum supra tenuiter impressis subtus tenuiter elevatis, venis venulis supra non visis, subtus distincte visis tenuissimis. Frons herbaceo-coriacea

supra subglabra subtus ad venas paucè squamata vel subglabra margine pilis tenuissimis longissimis paucè instructa. Sori utroque latere costæ segmentorum 1-seriatim dispositi. Indusium cordato-reniforme.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI. Jan., 1912.

**Dryopteris** (*Ctenitis*) **Eatonii** (BAK.) O. KRZE. (Fig. 90).

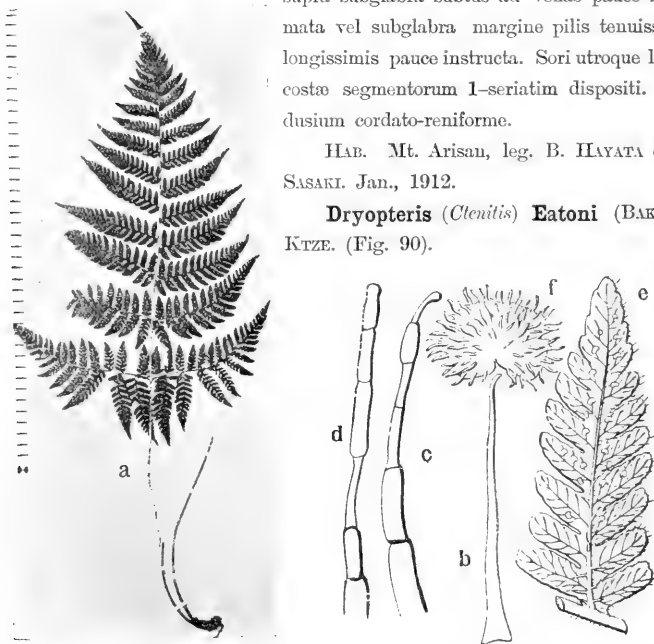


Fig. 90, *Dryopteris Eatonii* O. KRZE.; a, the plant; b, a scale at the base of the stipe; c, d, hairs on the frond; e, a pinnule; f, an indusium.

HAB. Kōtōshō, leg. K. MIYAKE, Nov., 1899.

Compared with a specimen so labelled from the Philippines.

**Dryopteris** (*Lastrea*) **Beddomei**  
(BAK.) O. KTZE. (Fig. 91).

HAB. Rinkiho, ad  
7000 ped. alt., Aug.  
1911, leg. H. INABA.

**Dryopteris** (*Lastrea*)  
**gracilescens**  
(BL.) O. KTZE. (Fig. 92).

HAB. Arisan, leg.  
B. HAYATA et S. SASAKI  
Jan., 1912.

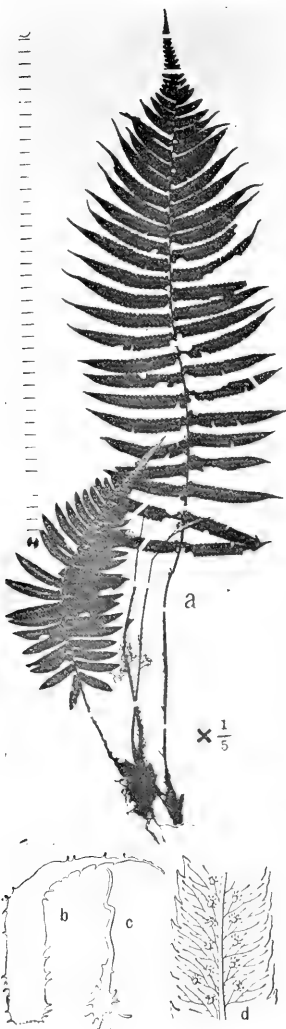
Compared with a  
specimen so labelled  
in the herbarium of  
Tōkyō.



Fig. 91, *Dryopteris* (*Lastrea*) *Beddomei*  
O. Ktze.; c, the plant; b, a pinna.



Fig. 92, *Dryopteris* (*Lastrea*)  
*gracilescens* O. Ktze.; a, the plant; b, a  
scale; c, portion of a pinna; d, a sorus.



**Dryopteris** (*Eudryopteris*) **hirtipes**  
(BL.) O. Ktze. (Fig. 93).

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Compared with a specimen so labelled in the herbarium of Tōkyō.

**Dryopteris** (*Phegopteris*) **fluvialis**  
HAYATA sp. nov. (Fig. 94). Rhizoma ascendens suberectum. Stipes 50-60 cm. longus basi paucè squamatus toto glaberrimus, squamis cuspidato-ovatis 3 mm. longis 2 mm. latis integris apice acuminato-cuspidatis basi  $\pm$  cordatis. Frons 65 mm. longa 50 cm. lata ovato-triangularis apice acuminata infra medium latissima basi minus lata basi subtruncata bipinnata vel tripinnata, pinnis infimis 30 cm. longis 10 cm. latis lineari-lanceolatis apice acuminatissimis basi truncatis subsessilibus vel brevissime petiolatis, pinnulis ordinis primarii infimis lanceolatis sessilibus 8 cm. longis  $2\frac{1}{2}$  cm. latis apice acuminatissimis basi truncatis, pinnulis ordinis secundarii infimis oblongo-lanceolatis 18 mm. longis 8 mm. latis apice obtusissimis basi leviter adnatis margine lobulatis, lobulis quadrangularibus 3 mm. longis 2 mm. latis apice truncatis a rachibus 1 mm. distantibus utroque latere costularum 1-seriatim soriferis; frons textura tenuiter herbacea, in exsiccato fuscens. Pinnæ inferiores a se

Fig. 93, *Dryopteris hirtipes* O. Ktze.; a, the plant; b, a scale on the stipe; c, a scale on the rachis, smaller one; d, a portion of a pinna.

10 cm. remotæ a rachibus frondium angulo  $40^{\circ}$ – $50^{\circ}$  divaricatæ, pinnulis ordinis primarii inferioribus a se 3 cm. remotis a rachibus pinnarum  $70^{\circ}$ – $80^{\circ}$  divaricatis, pinnulis ordinis secundarii inferioribus a se 1 cm. remotis a rachibus

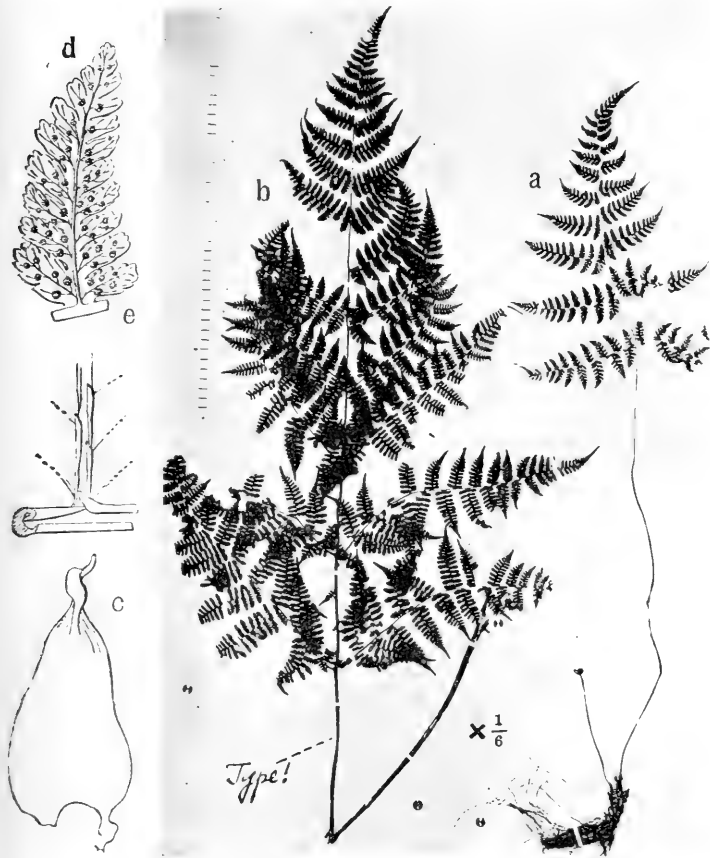


Fig. 94, *Dryopteris fluvialis* HAYATA; a, a smaller specimen of the plant; b, a larger one; c, a scale on the rhizome; d, a pinnule; e, portion of a setulose costula (upper surface)

pinnularum angulo recto egressis; costis pinnularum supra canaliculatis utroque latere canaliculorum alato-costulatis, costulis remote setuliferis, setulis complanatis  $\frac{1}{2}$  mm. longis. Sori rotundati haud involuerati. Indusium nullum.

HAB. Arisan, secus fossas, ad 7-8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *D. crenulato-serrulata* C. CH., but differs from it by the much fewer scales at the base of the stipes and much larger fronds.

**Dryopteris** (*Eudryopteris*) **hypophlebia** HAYATA sp. nov. (Fig. 95). Rhizoma suberectum apice stipites cæspitosos gerens. Stipes 15-20 cm. longus sursum paucè basi densissime squamatus, squamis inferioribus ovatis lanceolatis

tenuissimis castaneis fuscis usque  $1\frac{1}{2}$  cm. longis 4 mm. latis apice longe cuspidato-acuminatis margine subintegris, squamis (ad rhachin) minoribus cuspidato-ovatis 3 mm. longis 1 mm. latis margine remote setosis fusco-nigricanti-



Fig. 95, *Dryopteris hypophlebia* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule.

bus. Frons ovato-lanceolata 30 cm. longa 13 cm. lata apice acuminata basi truncata pinnata, pinnis superioribus brevioribus, inferioribus longioribus subæquilongis a se 4 cm. remotis suboppositis a rachibus angulo  $50^{\circ}$ – $80^{\circ}$  divaricatis pyramidali-lanceolatis 8 cm. longis  $2\frac{1}{2}$  cm. latis subsessilibus vel breve petiolatis (petiolis 3 mm. longis) inæqualibus, latere superiore quam latere inferiore angustioribus, pinnatis vel pinnatifidis, segmentis infimis (latere inferiore) longissimis  $1\frac{1}{2}$  cm. longis 8 mm. latis oblongo-rectangularibus apice rotundatis basi truncato-contractis margine inferiore lobulatis superiore duplicato-serrulatis; textura coriacea; costæ pinnarum basi  $\pm$  canaliculatæ sursum planæ distincte coloratæ subtus elevatæ  $\pm$  squamatæ, costulis venis venulisque supra impressis subtus leviter elevatis distincte coloratis distincte visis tenuissimis; pagina supra viridissima subtus pallidior. Sori utroque latere costulæ segmentorum 1-seriatim a basi usque medium frondis dispositi. Indusium cordatum.

HAB. Arisan, leg.

B. HAYATA et S. SASAKI,  
Jan., 1912.

**Dryopteris** (*Ctenitis*) **Kawakamii**  
HAYATA (Fig. 96),  
Mater. Fl. Formos. p.  
416. Stipites erecti  
14 cm. longi dorso  
(supra) 3-sulcati  
stramineo-rubrescentes  
squamati, (squamis  
copiosis imbricatis in

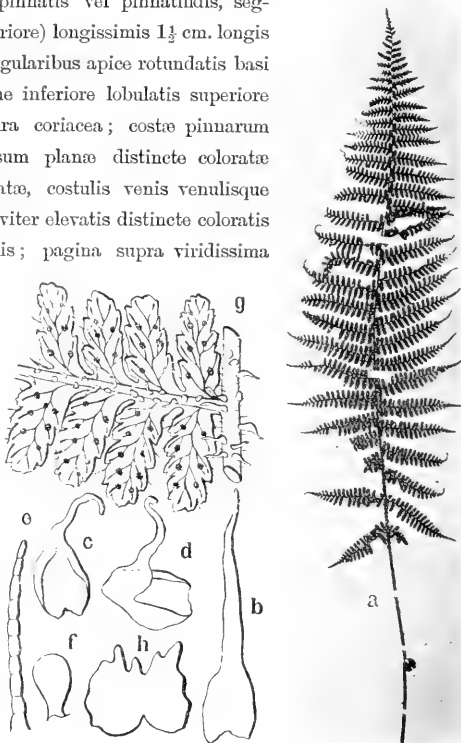


Fig. 96, *Dryopteris* (*Ctenitis*) *Kawakamii* HAYATA; a, the plant; b, a scale on the stipe; c, d, scales on the costa of a pinna; e, a hair on the upper surface of the costa of a pinna; f, a glandular hair on the under surface of the costa of a pinna; g, basal portion of an upper pinna h, an indusium.

magnitudine variabilibus lineari-cuspidatis acuminatis fusco-stramineis 8-9 mm. longis 1 mm. latis interdum basi cordatis), etiamque pilis crispatis dense oblecti. Frondes lanceolatæ in ambitu 50 cm. longæ 15 cm. latæ apice acuminatæ basi obtusæ bipinnatæ, pinnis lateralibus angusto-lanceolatis sessilibus, superioribus a rhachibus angulo  $90^\circ$  patentibus, inferioribus et infimis reflexis, pinnis sub pinna media frondis longissimis 10 cm. longis 2 cm. latis apice acuminato-linearibus a medio usque ad basin æquilatis, pinnis infimis brevissimis reflexis angulo  $150^\circ$  a rhachibus patentibus  $2\frac{1}{2}$  cm. longis 1 cm. latis, pinnis utroque latere frondium 30 a se  $1-1\frac{1}{2}$  cm. remotis; rhaches supra sulcatæ pilosæ squamatæ, rhachillæ supra sulcatæ dense rubro-hirsutæ subtus paucissime pilosæ squamis lanceolatis 1-2 mm. longis basi ventricosis instructæ; pinnulæ ad medium pinnarum late lineares 1 cm. longæ 3 mm. latæ sessiles æquilatæ obtuse dentatæ, (dentibus utroque latere 3-4-5 plus minus ascendentibus vel transversis obscuris), supra densiuscule subtus parcissime strigoso-pilosæ, (pilis rigidis crispatis 1 mm. longis), margine plus minus revolutæ, (venulis liberis), sub quoque dente 1-soriferæ, rarius 2-soriferæ. Sori depresso-orbiculares 1 mm. in diametro, receptaculis a margine  $\frac{1}{2}$  mm. remotis, indusiis generaliter obsoletis rarius late orbicularibus cordatis.

HAB. Randaian, leg. U. MORI, 1908, Aug. (No. 7134).

**Dryopteris** (*Eudryopteris*) **Kodamai** HAYATA sp. nov. (Fig. 97). Rhizoma? Stipes 14 cm. longus tereto-complanatus basi dense squamifer, squamis inferioribus maximis  $1\frac{1}{2}$  cm. longis 2 mm. latis linearibus acuminatis, sursum glabratus. Frons triangularis vel late pentagona 15 cm. longa totiusque lata vel latior apice triangulari-acuta basi latissima bi-tri-pinnata, pinnis suboppositis (pinnis inferioribus bipinnatis, pinnis superioribus pinnatis), pinnis infimis longissimis 10 cm. longis bipinnatis vel bipartitis petiolatis, (petiolis 1 cm. longis), partibus inferioribus (vel pinnulis infimis) cum superioribus æquilongis vel brevioribus 8 cm. longis lanceolatis pinnatis, pinnulis lanceolatis inferioribus  $1\frac{1}{2}$  cm. longis 5 mm. latis apice obtusis basi cuneatis basi  $\pm$  adnatis sessilibus margine duplicato-serratis, serris aristatis; frons a medio sursum sorifera; sori utroque latere pinnularum 1-seriatim siti; pinnis inferioribus a se 2-3 cm. remotis angulo  $45^\circ$  a rachibus frondium divaricatis, pinnulis in-



ferioribus primariis vel secundariis inferioribus a se 5 mm. remotis a rhachibus angulo  $60^{\circ}$  egressis; textura herbaceo-coriacea. Costulæ pinnularum supra canaliculatae utroque latere canaliculorum interrupte costulatae. Sori valde elevati globosi. Indusium cordatum globosum 1 mm. in diametro.

HAB. In monte Taiton, ad 1200 metra alt., leg. U. FAURIE, 1903, mai.

Remarkable for the very much elevated sori.

**Dryopteris** (*Ctenitis*) **kusukusensis** HAYATA sp. nov. (Fig. 98). Rhizoma? Stipes rhachibus costis venisque totis castaneorubescens sub lente minute pubescens, pilis pluricellularibus, 30 cm. longus basi dense sursum parce squamatus,

squamis lineari-lanceolatis 5-8 mm. longis 1-2 mm. latis. Frons ovato-lanceolata 45 cm. longa 22 cm. lata apice acuminata basi in ambitu cordata pinnata vel infima bipinnatifida, pinnis inferioribus lanceolatis suboppositis a se 5 cm. remotis a rhachibus frondium angulo  $80^{\circ}$ - $70^{\circ}$  divaricatis,



Fig. 97, *Dryopteris Kodanai* HAYATA.

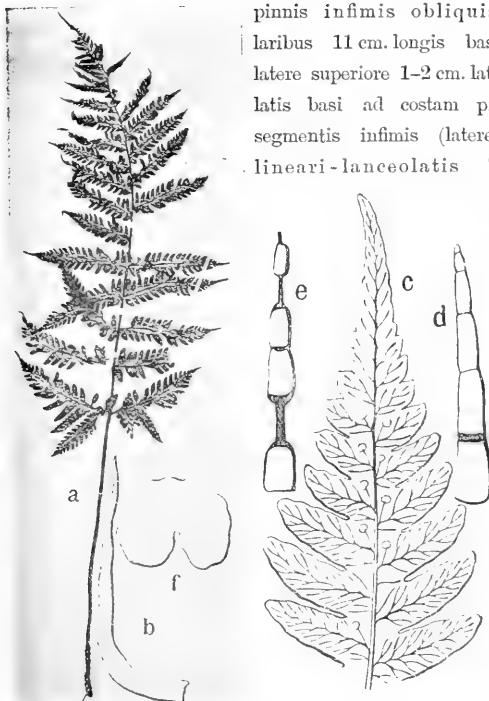


Fig. 98, *Dryopteris kusukusensis* HAYATA; a, the plant; b, a scale on the stipe; c, apical portion of a pinna; d, e, hairs on the frond.

pinnis infimis obliquis vel semi-triangularibus 11 cm. longis basi latissimis 9 cm. latis latere superiore 1-2 cm. latis latere inferiore 7 cm. latis basi ad costam pinnatifidis, pinnulis vel segmentis infimis (latere inferiore) longissimis lineari-lanceolatis  $7\frac{1}{2}$  cm. longis 18 mm.

latis apice acuminatis basi  $\pm$  contractis a se  $1\frac{1}{2}$  cm. remotis a costa angulo  $50^\circ$  egressis, margine regulariter lobulatis, lobulis oblongo-rectangularibus apice obtusissimis basi latissimis 6 mm. longis 4 mm. latis; textura herbacea. Frons medio sursum sorifera. Indusium rotundato-cordatum.

HAB. Kusukusu, Juli., 1912, leg. B. HAYATA et S. SASAKI.

Very near *D. nembranoides* HAYATA, but

differs only by the thicker herbaceous texture.

***Dryopteris (Cyclosorus) lævifrons* HAYATA sp. nov.** (Fig. 99). Rhizoma? Stipes 70 cm. longus basi circ. 1 cm. in diametro squamis parvissime instructus lævis stramineus, (squamis linearibus circ. 1 cm. longis), sursum pinnae reductis auriculiformibus 2-4 instructus, auriculis triangularibus lobulatis 1 cm. longis 1 cm. latis basi non adnatis sessilibus apice obtusis vel rotundatis a se 5 cm. remotis. Frons 90 cm. longa 25 cm. lata in ambitu lanceolata apice longe acuminatissima basi acuta pinnata, pinnis subalternatis linearibus, inferioribus

longissimis infimis paullo brevioribus, superioribus gradatim brevioribus versus apicem gradatim ad lobum pinnae terminalis abeuntibus; pinna terminali lineari lateralibus conformi pinnis mediis æquilonga, pinnis mediis linearibus 17 cm. longis 12 mm. latis apice acuminatissimis basi sessilibus vel brevissime petiolatis margine truncato-dentatis vel lobulatis, (dentibus inferioribus quadrangularibus truncatis latere superiore 1 mm. longis latere inferiore 2 mm. longis apice truncatis ad centrum emarginatis interdum versus latus superius acutis, dentibus superioribus triangularibus acutis ascendentibus), apice ad acumen subintegris. Textura membranacea, pagina glaberrima vel supra ad costam pinnae paucissime hirsuta, costis supra elevatis tenuiter sulcatis subtus elevatis, costulis venis venulisque utraque pagine tenuiter distincte elevatis, pinnis a rhachibus frondium, et costulis a costa pinnae circ. angulo  $60^\circ$  egressis, pinnis inferioribus a se 3 cm. remotis, pinnis cum rhachibus frondium articulatis in exsiccato articulatim solutis. Sori utroque latere costulae dentium 1-2 vel 1-seriatim dispositi vel utroque latere costae pinnae 1-seriatim dispositi. Indusium reniforme.

HAB. Kōshūn, Kuraru, leg.  
B. HAYATA, Juli, 1912.

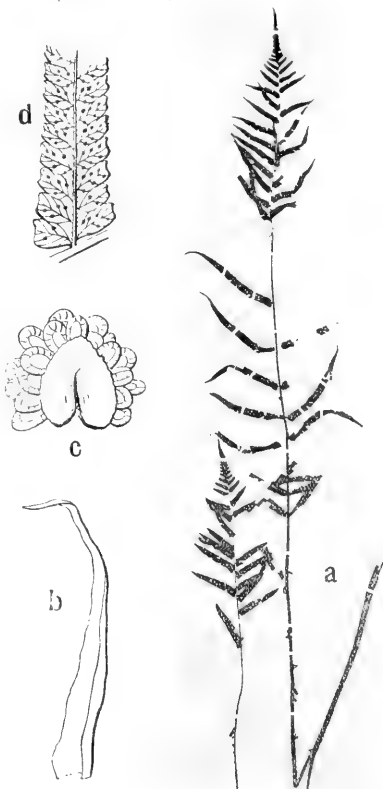


Fig. 99, *Dryopteris (Cyclosorus) lavifrons* HAYATA; a, the plant; b, a scale on the stipe; c, a sorus; d, portion of a pinna.

Near *D. truncata* O. KTZE., but differs from it by the much more smooth stipes and much more truncate lobes of the pinnae. Also near *Nephrodium cusorum* (BEDD. Fern. Brit. Ind. t. 130), but differs from it by the less divided or lobed pinnae and far much smaller form of the fronds. It bears some resemblance to *Neph. extensum* BLUME var. *minor* (BEDD. Fern. Brit. Ind. t. 201), but distinguishable from it by the truncately lobed pinnae.

**Dryopteris** (*Eudryopteris*) **thysanocarpa** HAYATA (Fig. 100) = *Athyrium*

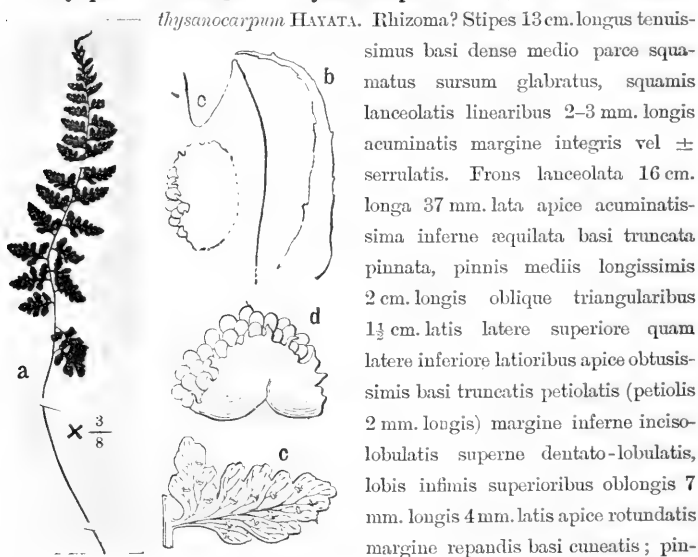


Fig. 100, *Dryopteris thysanocarpa* HAYATA; a, the plant; b, a scale on the stipe; c, a pinna; d, a sorus; d', another sorus to be found at apical portions of the frond.

*thysanocarpum* HAYATA. Rhizoma? Stipes 13 cm. longus tenuissimus basi dense medio parce squamatus sursum glabratus, squamis lanceolatis linearibus 2-3 mm. longis acuminatis margine integris vel  $\pm$  serrulatis. Frons lanceolata 16 cm. longa 37 mm. lata apice acuminatissima inferne æquilata basi truncata pinnata, pinnis mediis longissimis 2 cm. longis oblique triangularibus  $1\frac{1}{2}$  cm. latis latere superiore quam latere inferiore latioribus apice obtusissimis basi truncatis petiolatis (petiolis 2 mm. longis) margine inferne inciso-lobulatis superne dentato-lobulatis, lobis infimis superioribus oblongis 7 mm. longis 4 mm. latis apice rotundatis margine repandis basi cuneatis; pinnis infimis a rhachibus frondium angulo recto, superioribus angulo  $80^\circ$  divaricatis, lobis infimis pinnarum

mediarum a costa pinnae angulo recto divaricatis, pinnis inferioribus a se 12 mm. remotis, pinnis infimis  $\pm$  desuper reflexis. Textura herbacea; rhachis frondis recta. Sori utroque latere pinnae uniseriatim siti vel utroque latere lorum pinnularum uniseriatim siti elevato-globosi plus quam 1 mm. in diametro. Indusium reniforme vel rotundatum margine fimbriato-denticulatum.

HAB. Biōritsu: Rokujōdaisan, leg. U. MORI, 1908, Oct.

The fronds are exactly like those of *Microlepia Wilfordii* MOORE or *M. rhomboidea* (HOOK. 2nd Cent. Fern. t. 48), but the fructification is undoubtedly that of *Dryopteris*. Indusium is generally cordate or sometimes oblong, attaching to the fronds by one side and tends to be like that of *Athyrium*. It is especially so towards the apex of the fronds. Near *Cystopteris Douglasii* (HOOK. Ic. Pl. t. 955) and *Cystopteris tasmanica* (HOOK. Ic. Pl. t. 955), but differs from them by the petiolate more deeply lobed or pinnatifid pinnae.

**Dryopteris** (*Eudryopteris*) **lepidopoda** HAYATA sp. nov. (Fig. 101). Rhizoma? Stipes 23 cm. longus cum rhachibus densissime squamatus, squamis lineari-lanceolatis 7 mm. longis 1–2 mm. latis apice longe acuminatis basi rotundatis remote ciliolatis vel subintegris. Frons quam stipite multo longior 50 cm. longa 23 cm. lata ovato-lanceolata pinnata, pinnis mediis longissimis lineari-lanceolatis 13 cm. longis basi latis-

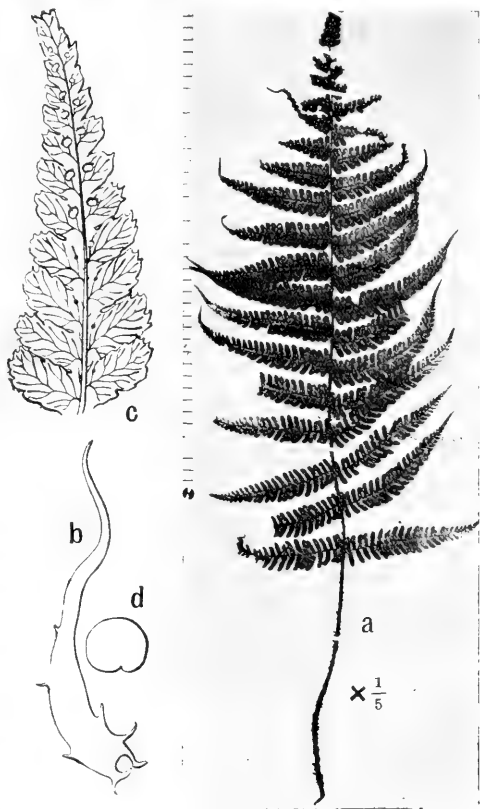


Fig. 101, *Dryopteris lepidopoda* HAYATA; a, the plant; b, a scale on the rhachis of the frond; c, apical portion of a pinna; d, an indusium.

simis  $2\frac{1}{2}$  cm. latis truncatis sessilibus a se  $2\frac{1}{2}$  cm. remotis angulo recto divari-  
catis pinnatim fidis inferiore ad rhachin fidis superiore prope rhachin fidis-  
segmentis inferioribus rectangularibus 13 mm. longis 5 mm. latis apice subtrun-  
catis vel rotundatis margine remote obscureque serrulatis vel subintegris apice

denticulatis; frons chartacea, costa pinnarum supra  
subplana subtus elevata, venis et venulis supra non  
elevatis vix visis subtus castaneo-coloratis tenuis-  
simis distincte visis. Sori utroque latere costulæ  
segmentorum 1-seriatim dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI,  
Jan., 1912.

Near *D. pachyphylla*  
HAYATA, but differs from it  
by the thinner, less black  
and less ciliated scales on  
the rhachis, and by the  
thinner fronds.

**Dryopteris** (*Eudry-*  
*opteris*) **leptorhachia** HAYATA  
sp. nov. (Fig. 102).  
Rhizoma erecto-ascendens.  
Stipes cum rhachibus nitidus  
castaneus vel castaneo-rubes-  
cens 50 cm. longus inferiore  
dense superiore parce squa-  
matus, squamis inferioribus  
lineari-lanceolatis apice acu-  
minatis 2 cm. longis 2 mm.  
latis. Frons ovata 40–50 cm.  
longa 30–40 cm. lata bipin-  
nata, pinnis inferioribus  
longioribus a se 11 cm. re-  
motis angulo  $40^\circ$  a rhachibus



Fig. 102, *Dryopteris leptorhachia* HAYATA; a, the plant;  
b, a hair on the costa of a pinnule; c, a pinnule or a segment  
of a pinnule; d, e, glandular hairs on the costa of a pinnule.

egressis, infimis ovato-oblongis 25 cm. longis 12 cm. latis apice acuminatis basi rotundatis petiolatis (petiolis 2 cm. longis) pinnatis, pinnulis mediis longissimis a se 2 cm. remotis a costa pinnæ angulo  $50^{\circ}$ – $80^{\circ}$  egressis lineari-oblongis  $6\frac{1}{2}$  cm. longis 22 mm. latis apice acuminato-obtusis basi truncatis breve petiolulatis ad costas pinnatifidis, segmentis lineari-oblongis 12 mm. longis 5 mm. latis apice obtuso-rotundatis basi contractis decurrentibus lobulatis ad summum serrulatis, lobulis 1–2 mm. longis apice  $\pm$  serrulatis. Textura herbacea pagine pilis pluricellularibus parce dispersa; costa pinnularum supra canaliculata, costulæ utroque latere canaliculorum costæ sitæ lamellatæ; venis venulisque subtus distincte visis. Sori ad basin segmentorum vel lobulorum segmentorum dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Somewhat near *D. Matsu-muræ*, but differs from it by the serrulate lobes of the pinnules.

***Dryopteris (Ctenitis) leucostipes*** (BAKER) C. CH. (Fig. 103, A–B), HAYATA Mater. Fl. Formos. p. 418.

HAB. Keelung.

DISTRIB. Liukiu.

***Dryopteris (Eudryopteris) melanocarpa*** HAYATA sp. nov.

(Fig. 104). Rhizoma erectum ascendens. Stipes 30–40 cm. longus rubro-castaneus basi squamatus, squamis inferioribus latissimis amplexicaulibus ovatis 7 mm.

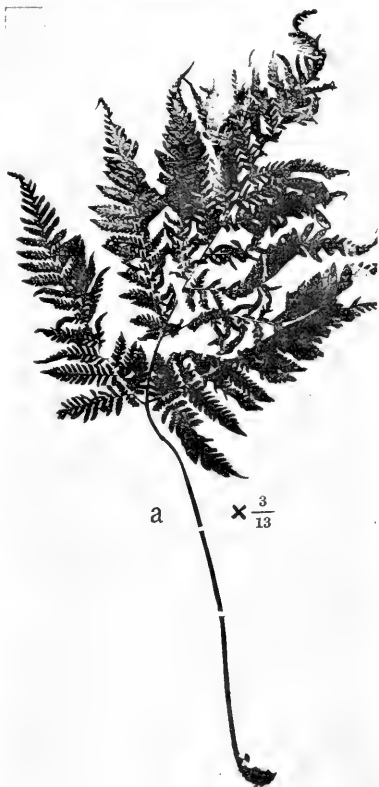


Fig. 103-A, *Dryopteris leucostipes* C. CH.; a, the plant.

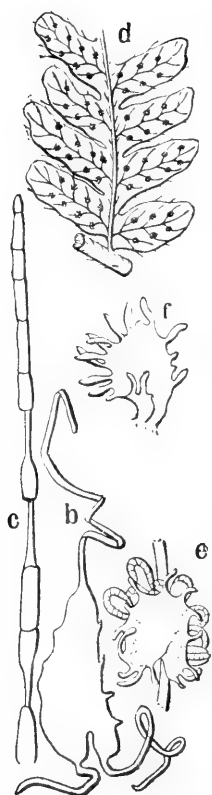


Fig. 103-B, *Dryopteris leucostipes* C. Chr.; b, a scale on the under surface of a pinna; c, a hair on the frond; d, a portion of a pinna; e, a sorus; f, an indusium.

margine duplicatoserrulatis; pinnis inferioribus a se 8 cm. remotis superioribus lanceolatis acuminatis-

longis 3-4 mm. latis apice acutis basi roundatis integris tenuissimis stramineo-castaneis, squamis superioribus gradatim angustioribus. Fronsovata 34 cm. longa 25 cm. lata apice acuminata basi in ambitu cordata bipinnata vel bipinnatifida, pinnis suboppositis, infimis longissimis 17 cm. longis versus apicem valde falcatis hastato-bipartitis, pinnis reliquis triangulari-lanceolatis falcatis, pinnis infimis 17 cm. longis longissimis breve petiolatis falcatis hastato-bipartitis, partibus inferioribus lanceolatis 9-10 cm. longis  $2\frac{1}{2}$  cm. latis apice acuminatis basi truncatis subsessilibus superiore falcatis pinnatifidis, segmentis infimis oblongis  $1\frac{1}{2}$  cm. longis 6 mm. latis apice obtusissimis basi cuneatis latere inferiore ad rhachin decurrentibus

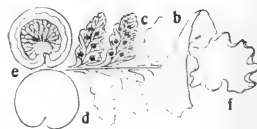


Fig. 104, *Dryopteris melanocarpa* Hayata; a, the plant; b, a scale on the rhizome; c, portion of a pinnule; d, a sorus, seen from above; e, the same, seen from below; f, an indusium after dispersion of spores.



frondium angulo  $70^{\circ}$  divaricatis, pinnulis inferioribus a se 2 cm. remotis, partibus pinnæ infimæ retrorsum reflexis falcatis. Sori valde elevato-globosi; indusia reniformi-cordata 1 mm. lata. Textura herbaceo-membranacea.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. Sabaci* in the outline of the fronds and globose elevate sori; but differs from it by the much more acuminate pinnæ. This is still nearer to *D. sparsa* O. KUNTZE (*Nephrodium sparsum* DON), but distinguishable from it by the lowest pinnæ with much longer pinnules.

**Dryopteris** (*Eudryopteris*) **membranoides** HAYATA sp. nov. (Fig. 105). Rhizoma erectum. Stipes 30 cm. longus squamatus cum rhachibus et costis pinnarum castaneo-rubescens breve pubescens, squamis lineari-lanceolatis 1 cm. longis 1-2 cm. latis acuminatis. Frons ovato-lanceolata 60 cm. longa 30 cm. lata infra medium latissima pinnata vel infima bipinnatifida, pinnis inferioribus lineari-lanceolatis sessilibus a se 4 cm. remotis a rhachibus frondium angulo  $80^{\circ}$ - $90^{\circ}$  egressis, infimis oblique triangularibus vel semi-triangularibus 14 cm. longis basi 11 cm. latis latere superiore 2 cm. latis latere inferiore 8 cm. latis basi ad costam pinnatifidis, segmentis infimis (latere



Fig. 105, *Dryopteris membranoides* HAYATA; a, the plant; b, a scale at the apex of the rhizome; c, a hair on the under side of the costa of a pinnule; d, a portion of a pinna; e, an indusium.

inferiore) longissimis a costa pinnae angulo  $80^{\circ}$  egressis lanceolatis 8 cm. longis medio  $2\frac{1}{2}$  cm. latis basi  $\pm$  contractis margine pinnatim lobulatis, lobulis lineari-oblongis longissimis  $1\frac{1}{2}$  cm. longis 5 mm. latis apice obtusissimis, sinibus inter lobulos obtusis, margine integris. Textura tenuissime membranacea parvissime pubescens, pilis pluricellularibus, venis venulisque utraque pagine

elevatis tenuissimis distincte visis subtus pilis dispersis. Indusium cordatum tenuissimum.

HAB. Urai : Rahao, leg. K.

MIYAKE, Oct., 1899.

Near *Lastrea melanopus* (HOOK.) (BEDD. Fern. Brit. Ind. t. 38), but differs from that by the far more larger fronds with bipinnatifid lowest pinnae; also near *Dictyopteris tuerkifrons* (HOOK.) (BEDD. Fern. Brit. Ind. t. 4) and *Pleocnemia membranifolium* PRESL. (BEDD. Handb. Fern. Brit. Ind. p. 227, fig. n. 115), but differs from the latter by the longer fronds with castaneous scales.

**Dryopteris** (*Eudryopteris*) **morrisonensis** HAYATA Mater. Fl. Formos. p. 450. *Dryopteris spinulosa* O. Ktze. var. *morrisonensis* HAYATA Mater. Fl. Formos. p. 422.

HAB. Monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. MORI, 1906, Oct. (No. 2500).

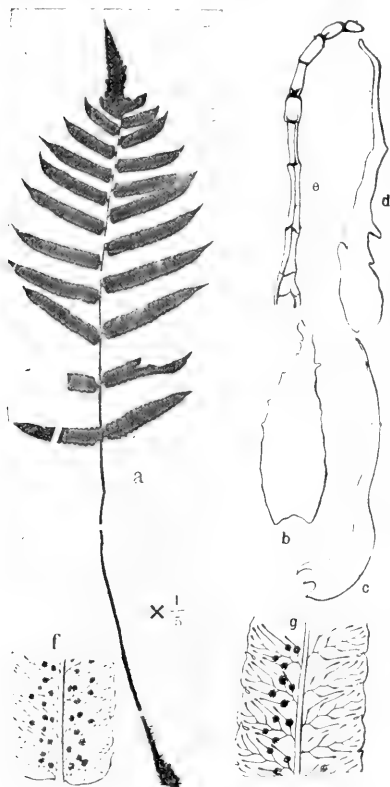


FIG. 106, *Dryopteris nigrisquama* HAYATA; a, the plant; b, a scale at the base of the stipe; c, a scale on the frond rhachis; d, a scale on a pinna; e, a hair on a pinna; f, basal portion of a pinna; g, middle portion of the same.

**Dryopteris** (*Eulryopteris*) **nigrisquama** HAYATA sp. nov. (Fig. 106).

Rhizoma? Stipes 30 cm. longus basi dense sursum sparse squamatus, squamis totis nigris inferioribus majoribus oblongis lanceolatis triangulari-lanceolatis usque  $1\frac{1}{2}$  cm. longis usque 4 mm. latis, superioribus minoribus apice lineari-acuminatis basi truncatis vel tenuiter cordatis margine remote setosis vel integris. Frons oblongo-lanceolata 37 cm. longa 18 cm. lata apice subito acuminata basi truncata pinnata, pinnis mediis et inferioribus longissimis a se 4 cm. longis angulo  $70^{\circ}$ – $80^{\circ}$  a rhachibus divaricatis lineari-lanceolatis sessilibus 10 cm. longis  $1\frac{1}{2}$  cm. latis apice acuminatis ad summum obtusis basi latissimis truncatis vel truncato-acutis margine grosse serratis, serris inferioribus 4 mm. latis 1 mm. longis ascendentibus apice submucronatis proximatis; pinnæ rectæ vel sursum plus minus falcatæ supra subglabræ, costis supra tenuiter impressis subtus elevatis, venis lateralibus a se 3–4 mm. remotis basi ramosis ramis liberis supra non visis subtus tenuiter visis; textura herbaceo-membranacea; pinnis suboppositis vel alternis. Rhachis frondis minute squamata. Sori utroque latere costæ pinnæ 2–3-seriatim vel sursum 1-seriatim prope costas dispositi.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. decipiens*, but differs from it by the shape of scales and pinnæ.

**Dryopteris** (*Lastrea*) **ochthodes** C. CH. (Fig. 107), Ind. p. 280. *Lastrea ochthodes* (KUNZE) BEDD. Fern. South Ind. t. 106.

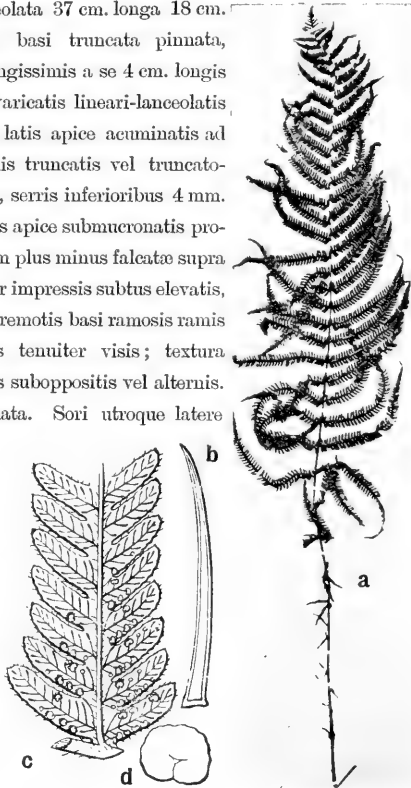


Fig. 107, *Dryopteris* (*Lastrea*) *ochthodes* C. CH.; a, the plant; b, a hair on the costa of a pinna; c, portion of a pinnule; d, an indusium

HAB. Mt. Arisan: Funkiko, Jan., 1912, leg. B. HAYATA et S. SASAKI.

Compared with a Japanese specimen in the Tōkyō herbarium. This fern is extremely variable in the size of the fronds.

**Dryopteris** (*Eudryopteris*) **pachyphylla** HAYATA sp. nov. (Fig. 108). Rhizoma? Stipes 20 cm. longus squamatus stramineus, squamis lineari-lanceolatis usque 7 mm. longis usque 1 mm. latis longe acuminatis basi rotundatis plus minus cordatis vel subpeltatis margine parce breveque ciliolatis. Frons lanceolata stipite multo longior 55 cm. longa 24 cm. lata apice cuspidato-acuminata medio deorsum æquilata basi plus minus angustior truncata pinnata, pinnis mediis longissimis a se 3 cm. remotis suboppositis vel alternis angulo recto divaricatis lineari-lanceolatis 15 cm. longis 25 mm. latis apice acuminatis basi truncatis sessilibus latissimis pinnatifidis versus basin circ. ad rhachin fissis, sursum

prope rhachin fissis, segmentis inferioribus rectangularibus 14 mm. longis 5 mm. latis apice truncatis approximatis a costa pinnae angulo 80° divaricatis margine remote minuteque

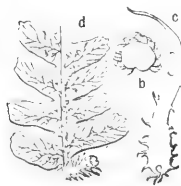


Fig. 108, *Dryopteris pachyphylla* HAYATA; a, the plant; c, a scale on the frond-rhachis; d, basal portion of a pinna; b, a sorus.

securulatis apice denticulatis. Textura coriacea pagina supra glabra nitida subtus pallidior glabra, rhachibus densiuscule squamatis, costis primariis supra canaliculatis, subtus elevatis squamis dispositis, costulis venisque

utraque pagine non distinctis vix visis; pinnis inferioribus plus minus reflexis, pinnis superioribus gradatim ascendentibus. Sori utroque latere costæ segmentorum 1-seriatim a basi frondis sursum dispositi, prope apicem frondis desunt.

HAB. Arisan, ad 7000 ped. alt., leg.

B. HAYATA et S. SASAKI, Jan. 1912.

Near *D. polylepis*, but differs from it by the much thicker coriaceous fronds with ebony black scales.

**Dryopteris** (*Eudryopteris*) **phæolepis**

HAYATA sp. nov. (Fig. 109). *Polystichum*

*phæolepis* HAYATA in sched. Herb. Taihoku.

Rhizoma ascendens apice dense squama-

tum. Stipes 35 cm. longus basi dense squa-

matus sursum glaber, squamis pyramidali-

lanceolatis 10 mm. longis 3 mm. latis apice

acuminatissimis basi latissimis truncatis

castaneis. Frons in ambitu pentagona 30-

40 cm. longa totiusque lata apice acuminata

basi in ambitu cordata tripinnata, pinnis

infimis bipinnatis, pinnis superioribus pin-

natis vel pinnatifidis, pinnis breve petiolatis,

pinnis superioribus lanceolatis, pinnis infimis

oblique triangularibus 20 cm. longis 16 cm.

latis latere inferiore basi 14 cm. latis latere

superiore basi 3 cm. latis apice acuminatis

basi obtusis, pinnulis infimis ordinis prima-

rii (latere inferiore) multo longioribus lineari-

lanceolatis 14 cm. longis 28 mm. latis apice

acuminatissimis basi obtusis pinnatis (latere

inferiore latioribus quam latere superiore),

pinnulis ordinis secundarii inferioribus lineari-oblongis 2 cm. longis 7 mm. latis

apice obtusissimis basi acutis plus minus adnatis sessilibus marginibus lobulatis,

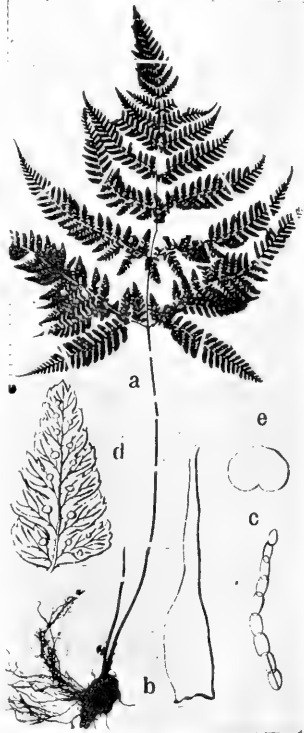


Fig. 109, *Dryopteris phæolepis* HAYATA; a, the plant; b, a scale on the rhizome; c, a hair on the lower surface of the fronds; d, a pinnule; e, an indusium.

lobulis infimis 3 mm. longis  $2\frac{1}{2}$  mm. latis oblique oblongis apice 2-3 aristato-serris instructis. Frons a medio sursum sorifera; pinnæ inferiores a rhachibus frondium angulo  $50^\circ$  egressis, pinnis a se 7 cm. remotis, pinnulis ordinis primarii inferioribus a se  $2\frac{1}{2}$  cm. remotis, pinnulis ordinis secundarii inferioribus a se 8 mm. remotis; textura herbaceo-

coriacea tennis, costis pinnulæ supra tenuiter

canaliculatis subtus elevatis, venis non visis; pagine supra glabra subtus pilis brevissimis parcissime oblecta. Sori utroque latere costæ pinnularum 1-seriatim dispositi.

HAB. Mt. Arisan: inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Somewhat near *Neph. recedens* (HOOK. Sp. Fil. t. 265); but differs from it by the scaly but not villose stipes and nearly glabrous fronds.

**Dryopteris** (*Meniscium*) **prolifera** C. CH. (Fig. 110) Ind. p. 286. *Poly-podium proliferum* LOWE Ex. Fern. Vol. II. t. 18. *Meniscium proliferum* = *Goniopteris proliferum*

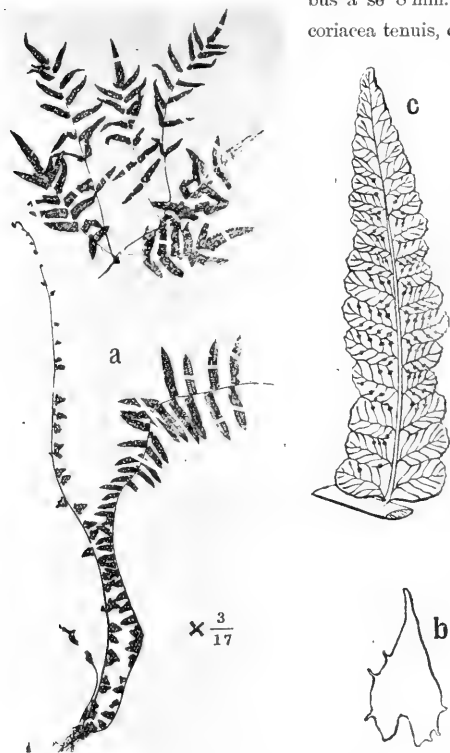


Fig. 110, *Dryopteris* [(*Meniscium*)] *prolifera* C. Cr.; a, the plant; b, a scale on the rhizome; c, a pinna.

(PRESL.) BEDD. Fern. South. Ind. t. 172 et Fandb. Fern. Brit. Ind. p. 296 fig. 173.

HAB. Satō, leg. H. INABA, Juli., 1911; Holisha, leg. T. SŪMA, 1911, Juli;  
Chikutōki, secus fossas crescens, leg. B. HAYATA et TAKEO ITŌ, Mart., 1914.

**Dryopteris** (*Eudryopteris*) **pseudosieboldii** HAYATA sp. nov. (Fig. 111).

Rhizoma? Stipes 35 cm. longus validus  
basi plus minus dilatatus minute muricato-  
punctatus basi dense squamatus sursum  
glabratus, squamis tenuibus lanceolatis  
ovatis usque 2 cm. longis 3-5 mm. latis  
apice filiforme acuminatis tenuissimis.  
Frons 40 cm. longa 30 cm. lata ovata apice  
in ambitu cuspidata basi in ambitu obtusa  
pinnata, pinnis totis æquiformibus æqui-  
longis, pinna terminali lineari-lanceolata  
circ. 20 cm. longa 28 mm. lata apice acumi-

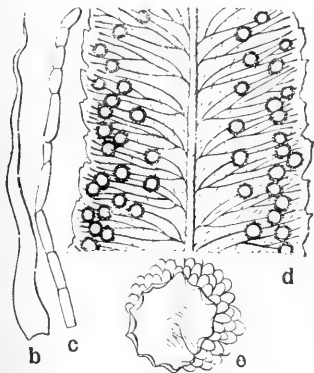


Fig. 111, *Dryopteris pseudosieboldii* HAYATA; a, the plant; b, a scale on the stipe;  
c, a hair on the lower surface of a pinna; d, portion of a pinna; e, a sorus.

nata (acumine lineari serrulato) basi obtusa margine tenuiter lobulata, lobulis  
inferioribus 3 mm. longis 6 mm. latis rotundatis subhorizontaliter sitis  
superioribus ad crenam reductis, sursum margine serrulato-denticulata, pinnis  
juxta terminalem paullo minoribus, pinnis inferioribus terminali æquilongis

marginē crenulato-lobulatis, lobis minoribus serrulato-denticulatis, denticulis acutis; pinnis inferioribus a se 5 cm. remotis a rhachibus frondium angulo 60° egressis; pinnis lateralibus utroque latere rhachis 6 suboppositis, costis pinnarum supra leviter impressis subtus elevatis, venis lateralibus angulo 80° a costa egressis a basi ramosis a se 5 mm. remotis supra et subtus non elevatis tenuissimis distinctis; pagina coriacea supra glabra subtus plus minus pilis pluricellularibus parce dispersa a margine usque ad medium utriusque lateris costæ sorifera supra viridissima subtus pallidior. Sori globosi 1½ mm. in diametro. Indusium cordatum margine undulatum sed integrum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. Sieboldii*, but differs from it by the arrangement of sori which are scattered towards the margin, but not along the costa. It is still nearer to *D. podophylla* (Nat. Pfl.-fam. Pterid. p. 169 fig. 91, C et A), but distinguishable from it by the acutely serrulate margin of the fronds, by the subentire indusium and in the venation.

**Dryopteris** (*Eudryopteris*) **quadripinnata** HAYATA n. n. (Fig. 112). *Microlophia quadripinnata* HAYATA Mater. Fl. Formos. p. 434. Stipites 28 cm. longi basi pilosissimi (pilis crispatis depressis densis) etiamque basi squamati, squamis nigricantibus lanceolatis 4½ mm. longis 1½ mm. latis apice cuspidatis basi rotundatis extus glabris sub lente intus dense pilosis vel glabris, basi fuscentes a medio sursum stramineo-flavescentes subnitidi supra sulcati subteretes. Frondes late rhomboideo-triangulares 32 cm. longæ 40 cm. late apice acutæ vel acuminate basi acutæ vel obtusæ hirsutæ herbacæ, partibus infimis quadri-pinnatis, inferioribus tri-pinnatis, superioribus bi-pinnatis, sursum simpliciter pinnatis, pinnis utroque latere rhachis frondis circ. 18 plus minus alternis, inferioribus circ. 6-7 cm. a se remotis subrectis apice ascendente-recurvatis a rhachibus angulo 60° divaricatis, pinnis infimis late triangularibus oppositis 22 cm. longis 20 cm. latis latere inferiore latioribus 12 cm. latis petiolatis (petiolis 2-3 cm. longis), pinnulis I. utroque latere 16 inferioribus 4 cm. a se remotis, infimis elongato-triangularibus 13 cm. longis 6 cm. latis apice acuminatis petiolulatis (petiolulis 1 cm. longis) remote pinnatis; pinnulis II. utroque latere 15, inferioribus a se 1-2 cm. remotis, infimis longissimis triangulari-lanceolatis 4½ cm. longis 2 cm. latis remote pinnatis; pinnulis



III. utroque latere 6, inferioribus a se 7 mm. remotis oblique ovatis apice obtusis basi oblique cuneatis subsessilibus 1 cm. longis 8 mm. latis etiamque pinnatis vel pinnatifidis, segmentis inferioribus obliquis obovatis apice obtusis basi cuneato-attenuatis 4 mm. longis 2 mm. latis paucidentatis, (dentibus utroque latere 2-3), segmentis superioribus obovatis obliquis subunilateralibus dentatis vel integris; rhaches frondium complanatæ semi-teretes supra sulcatæ ad utrumque latus sulcorum dense hirsutæ cæterum glabræ subtus convexæ glabræ stramineæ; rhaches pinnarum supra leviter sulcatæ vel elevatæ sursum subulatæ supra dense hirsutæ subtus glabræ; rhaches pinnularum I. II. et III. complanatæ supra densissime hirtellæ subtus glabræ, venis et venulis utrinque hirsutis; paginæ secus venas et venulas utraque hirsutæ, venulis apice furcatis, ramis superioribus brevioribus apice soriferis, ramis inferioribus longioribus non soriferis, interdum venulis simplicibus soriferis vel sterilibus, ramis prope apicem evanescentibus. Sori sub quoque dente segmentorum vel venularum III. singuli ab apice dentum  $\frac{1}{2}$ -1 mm. remoti ad apicem ramorum venularum terminales. Indusium late cordatum  $\frac{1}{2}$  mm. latum margine ciliatum.

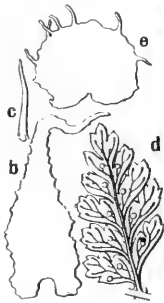


Fig. 112, *Dryopteris quadripinata* HAYATA; b, a scale on the rhizome; c, unicellular hair on the upper side of a costa of a pinnule; d, a pinnule; e, an indusium.

HAB. Nantō: Mushazan, leg. T. KAWAKAMI et U. MORI, 1906, Aug. (No. 2390); Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. (Aspidium) Miqueliana* C. CH., but differs from it by the ciliate indusium.

***Dryopteris* (*Eudryopteris*) *reflexipinna* HAYATA sp. nov. (Fig. 113)**



Fig. 113, *Dryopteris reflexipinna* HAYATA; a, the plant; b, portion of a pinnule; c, a sorus.

Rhizoma? Stipes erectus 40 cm. longus glaber esquamatus stramineus rectus. Frons erecta triangularis 30 cm. longa latior quam longa circ. 40 cm. lata

apice in ambitu abrupte acuminata basi latissima quadripinnata, pinnis utroque latere 8-9, infimis longissimis superioribus gradatim brevioribus ad apicem ad dentem pinnæ terminalis reductis, inferioribus a se 5 cm. remotis, infimis 18 cm. longis triangularibus 10 cm. latis basi latere inferiore 7 cm. latis latere superiore 4 cm. latis apice acuminatissimis (acumine lineari) basi petiolatis (petiolis 2-3 cm. longis) pinnulis ordinis primarii infimis (latere inferiore) 8 cm. longis lanceolatis falcato-ascendenti-recurvis basi latissimis  $3\frac{1}{2}$  cm. latis apice acuminatissimis sub-æquilateralibus breve petiolulatis, pinnulis ordinis secundarii infimis (latere inferiore) oblique triangularibus 2 cm. longis  $1\frac{1}{2}$  cm. latis apice obtusissimis basi subtruncatis breve petiolulatis; pinnulis ordinis tertiæ infimis (latere inferiore) oblique obovatis  $1\frac{1}{2}$  cm. longis 4 mm. latis apice rotundato-obtusis basi cuneatis subsessilibus subunilateralibus 1-2-lobatis, lobis 2 mm. longis totiusque latis obtusissimis; pinnulis ordinis tertiæ infimis lateris superioris latoribus majoribus quam iis lateris inferioris. Rhachis frondis glaberrima valde flexuosa, rhachis pinnarum minus flexuosa sursum subalata complanata, rhachis pinnularum subrecta complanata subalata; pinnis inferioribus a se 6 cm. remotis, pinnulis ordinis primarii inferioribus a se 2 cm. remotis, pinnulis ordinis secundarii inferioribus a se 1 cm. remotis, pinnulis ordinis tertiæ inferioribus a se 5 cm. remotis, pinnis infimis a rhachibus frondium angulo  $140^\circ$ , pinnis superioribus angulo  $90^\circ$  divaricatis, pinnulis a rhachibus pinnarum angulo obtuso vel angulo recto divaricatis, pinnulis ordinis secundarii a rhachibus pinnularum ordinis primarii angulo  $70^\circ$  vel plus acuto divaricatis; frons textura tenuiter herbacea viridis, costis venis venulis supra obscure subtus distincte visis tenuissimis.

HAB. Rinkihø, leg. H. INABA, Oct. 1911; Mt. Arisan; Heishana, ad 7000 ped. alt., leg. B. HAYATA et TAKEO ITÔ, Mart., 1914.

When I first examined a herbarium specimen of this fern, I thought that it might have been a fern of scandent or pendulous habit, as the pinnæ and pinnule are always turning backwards and the rhachis is very flexuose. In my last excursion to the island, I found the fern, quite contrary to my expectation, standing erect or nearly so on the ground. It is very rare; I could find the fern but once in my journey through the mountains. Somewhat allied to *D. Maximowiczii* in its habit, sori and size, but greatly differs

from it by the reflexed pinnæ and quite obtuse apex of the lobes. Also resembles *Lastrea undulata* (THWAITES) (BEDD. Fern. South Ind. t. 271), but distinguishable from it by the less flexuose quite glabrous rhachis and stipes. The ramification of the fern is somewhat similar to that of *Gymnogramme anfractuosa* CHRIST (Farnkräuter der Erde p. 73, fig. 187).

**Dryopteris** (*Eudryopteris*) **reflexosquamata** HAYATA sp. nov. (Fig. 114). Rhizoma? Stipes 20–30 cm. longus dense squamatus, squamis reflexis lanceolato-ovatis 9 mm. longis 2½ mm. latis apice acuminatissimis margine remote brevissimeque setoso-ciliatis. Frons oblonga vel oblongo-lanceolata

35–40 cm. longa medio latissima 20 cm. lata apice triangulari-acuta vel breve cuspidata basi rotundata bipinnata vel bipinnatifida, pinnis inferioribus a se 4 cm. remotis angulo 45° a rhachibus divaricatis, pinnis mediis longissimis lanceolatis 12 cm. longis 3½ cm. latis apice cuspidato-acuminatis basi plus minus contractis pinnatis, pinnulis inferioribus a se 6 mm. remotis a rhachibus angulo 80°–90° divaricatis lineari-lanceolatis, mediis longissimis 18 mm. longis basi latissimis 5–6 mm. latis apice obtusis basi abrupte cuneatis sessilibus a se 7 mm. remotis margine duplicato-serrulatis, serrulis obtusis

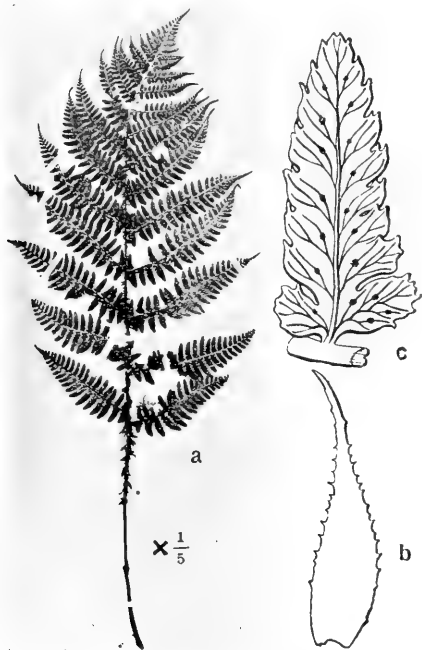


Fig. 114, *Dryopteris reflexosquamata* HAYATA; a, the plant; b, a scale of the stipe; c, a pinnule.

1½ mm. longis totiusque latis apice et margine serrulis setosis 2-3 instructis. Textura tenuiter coriacea, rhachibus frondium rectis dense squamatis; costis pinnae supra profunde sulcatis supra glabris subtus parce squamatis, squamis linearibus minutis, costulis et venis venulis supra impressis subtus ± elevatis; pagina supra glabra subtus minute parceque squamata. Sori utroque latere costae 1-seriatim dispositi.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Somewhat resembles *Neph. Falconeri* HOOK. Sp. Fil. t. 256, but differs from it by the far less scaly fronds.

**Dryopteris** (*Phegopteris*) **remota** HAYATA (Fig. 115) Mater Fl. Formos. p. 421. Stipites tenues 18 cm. longi 1 mm. in diametro glabri nitentes subteretes. supra profunde sulcati straminei. Frondes stipite breviores ambitu triangulares apice acuminatæ basi latissimæ 12 cm. longæ a basi 16 cm. latæ apice pinnatæ medio bipinnatæ infime tripinnatæ, pinnis remotissime oppositis, a rhachibus angulo 70° divaricatis, inferioribus 3 cm. a se remotis, infimis longissimis a basi sursum gradatim brevioribus; pinnis



Fig. 115, *Dryopteris remota* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule.

infirmis elongato-triangularibus 8 cm. longis a basi  $3\frac{1}{2}$  cm. latis petiolatis (petiolis 13 mm. longis) obliquis latere inferiore quam latere superiore latioribus, pinnulis I. inferioribus pinnatis a se circ. 1 cm. remotis superioribus pinnatifidis versus summum lobulatis, pinnulis I. infimis latere inferiore pin-

narum 23 mm. longis 1 cm. latis sessilibus basi pinnatis medio pinnatifidis sursum lobulatis, (segmentis infimis angustato-quadrangularibus 6 mm. longis  $1\frac{1}{3}$  mm. latis apice obtusis basi plus minus contractis vel ad rhachin adnatis divaricatis margine undulato-integris, undis utroque latere 3-4). Rhaches frondium semiteretes glabra tenuissimæ supra sulcata subtus convexæ; rhaches pinna- rum supra leviter sulcata glabræ; venis centralibus



Fig. 116, *Dryopteris serrato-dentata* HAYATA; a, the plant; b, a scale on the stipe; c, a portion of a pinna.

segmentorum infimorum et venulis flexuosis, venulis simplicibus ad sinus undarum attingentibus utrinque planis sed distinctis glabris; paginae membranaceæ utraque glabræ. Sori globosi circ.  $\frac{3}{4}$  mm. in diametro ad quasque venulas dorsaliter siti utroque latere venarum 1-seriatim 3-4 dispositi; receptaculum prope apicem venularum lineare. Indusium non visum verisimiliter obsoletum.

HAB. In monte Morrison, leg. G. NAKAHARA, 1905, Oct.; Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *Nephrodium Dryopteris*, but differs from it in the arrangement of the pinnæ.

**Dryopteris** (*Eudryopteris*) **serrato-dentata** (BEDD.) HAYATA n. n. (Fig. 116). *Dryopteris Filix mas* var. *serrato-dentata* BEDD.; HAYATA Mater. Fl. Formos. p. 416. *Lastrea odontoloma* MOORE BEDD. Handb. Fern. Brit. Ind. fig. 128.

HAB. In monte Morrison, ad 11000 ped. alt.

This is quite identical with the fern labelled as *D. Filix mas* var. *serrato-dentata* BEDD. in the herbarium at Kew. This fern is, however, so widely different from *D. Filix mas* in many points. It should better be regarded as specifically different from the type.

**Dryopteris** (*Leptogramma*) **squamæstipes** C. CH. (Fig. 117) Ind. p. 294. *Pleiopteris auriculata* BEDD. Handb. Fer. Brit. Ind. p. 290 t. n. 149. *Polypodium auriculatum* (WALL.) BEDD. Fer. Brit. Ind. t. 203.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.



Fig. 117, *Dryopteris* (*Leptogramma*) *squamæstipes* C. CH.; a, the plant; b, a scale on the stipe; c, a portion of a pinna; d, e, sporangia.

**Dryopteris** (*Cyclosorus*) **sophoroides** O. Ktze. form. **ensipinna**, (Fig. 118).

HAB. Botansha, leg. K. MIYAKE, Jan. 1900.

This looks different from *D. sophoroides*, but the venation, sori and

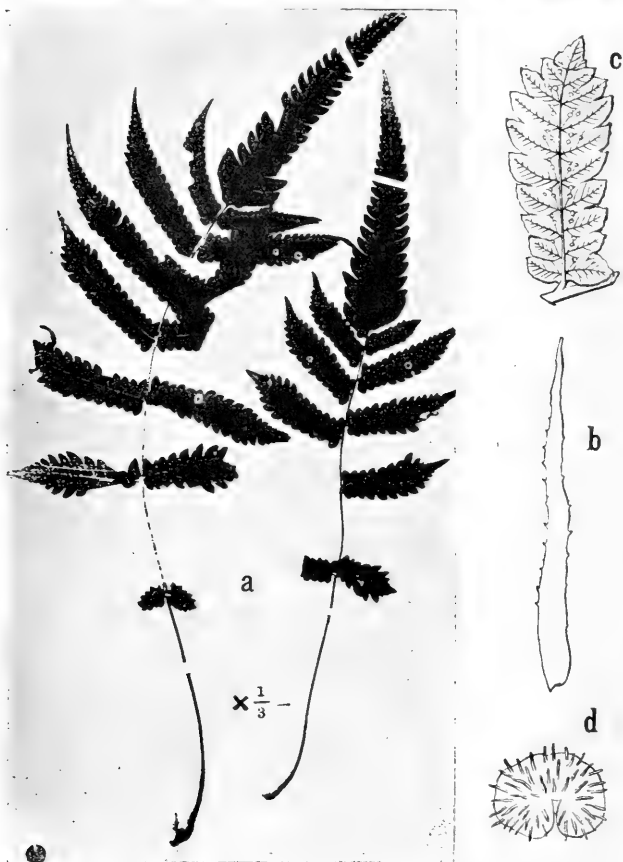


Fig. 118. *Dryopteris* (*Cyclosorus*) *sophoroides* O. Ktze.; a, the plant; b, a scale at the base of the stipe; c, a pinnule; d, an indusium.



scales are all very similar to those of the species, from which this may not be regarded as a distinct species nor even as a variety.

**Dryopteris** (*Eudryopteris*) **subdecipiens** HAYATA sp. nov. (Fig. 119).

Rhizoma suberectum apice dense squamatum, squamis ovato-lanceolatis nigris nitidis apice lineari-acuminatis plus 2 cm. longis 5 mm. latis. Stipes 30 cm. longus basi dense sursum parce squamatus, squamis inferioribus vel mediis linearibus 8 mm. longis basi 1 mm. latis subcordatis margine subintegris basi parce fimbriatis. Frons ovata 45 cm. longa 30 cm. lata apice cuspidata basi rotundata pinnata, pinnis mediis longissimis lineari-lanceolatis 15 cm. longis 3 cm. latis apice acuminatissimis basi late truncatis sessilibus margine crenato-lobulatis sursum ad acumen serratis, lobulis rotundatis ascendentibus 5 mm. longis 7 mm. latis latere superiore 1-2-mucronatis, pinnis suboppositis a rhachibus angulo  $80^\circ$  divaricatis, inferioribus 3-4 cm. a se remotis versus apicem  $\pm$  falcatis, costis supra impressis subtus

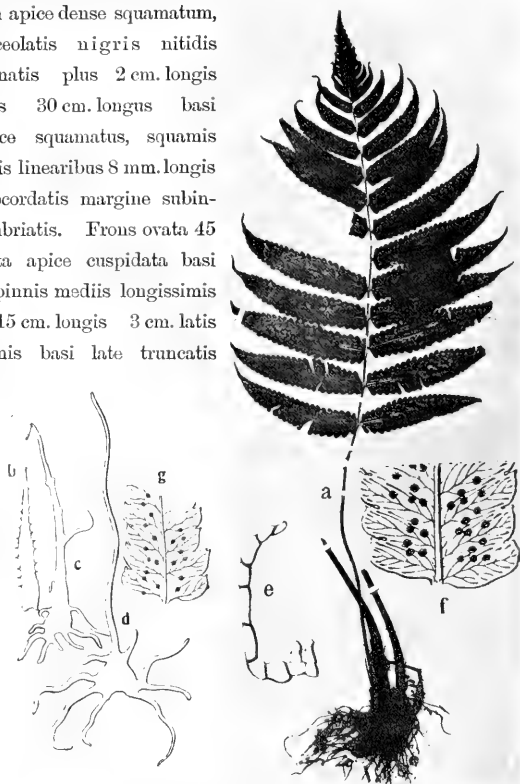


Fig. 119, *Dryopteris subdecipiens* HAYATA; a, the plant; b, a scale on the apical portion of the stipe; c, d, scales on the frond rhachis; e, a hair on the costule of a pinna; f, basal portion of a pinna; g, apical portion of the same.

elevatis, venis lateralibus a se circ. 6 mm. remotis a costa angulo  $50^\circ$  egressis

supra non visis subtus tenuiter visis distinctis a basi ramosis, ramis liberis. Textura herbaceo-membranacea. Sori secus costas multiserialim dispositi prope marginem haud dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *D. decipiens* O. KTZE. and *D. nigrisquama* HAY., but differs from them by the much larger fronds, acutely truncated base of the pinnae and by the scales on the rhachis which are long fimbriated at the base.

**Dryopteris** (*Eudryopteris*) **subexaltata** C. CH. (Fig. 120); HAYATA Mater Fl. Formos. p. 418.

HAB. Liukiu: Nago-dake, April, 1907, leg. G. NAKAHARA.



Fig. 120, *Dryopteris* (*Eudryopteris*) *subexaltata* C. CH.; a, the plant; b, a scale on the rhizome; c, a pinna.

**Dryopteris** (*Lastrea*) **sublaxa** HAYATA sp. nov. (Fig. 121). Rhizoma repens, radicibus filiformibus. Stipes parcissime squamatus 23 cm. longus stramineus glaber laevis, squamis lanceolatis 1–2 mm. longis. Frons lineari-lanceolata apice acuminata basi truncata 25 cm. longa 7 cm. lata pinnata, pinnis a rhachibus angulo 70°–90° divaricatis, inferioribus a se 1½ cm. remotis alternis, superioribus gradatim brevioribus, inferioribus lineari-lanceolatis 3½ cm. longis 1 cm. latis apice acuminatis ad summum obtusis basi latissimis truncatis sessilibus latere superiore latioribus quam latere inferiore, pinnatifidis vel pinnatilibus, lobis latere superiore infimis 6 mm. longis 2½ mm. latis lineari-oblongis apice obtusissimis, lobis superioribus gradatim minoribus ± acutis margine integris. Textura tenuiter membranaceo-herbacea, costa et vena pinnarum supra elevata densissime pilosa, pilis unicellularibus, subtus elevata subglabra pilis glanduliferis pluricellularibus brevissimis parce instructa; rhachibus brevissime villosis tenuissimis; pagina margine adpresse ciliata. Sori utroque latere costulae loborum vel utroque latere costulae pinnarum 1-seriatim dispositi. Indusium subcordatum margine integrum vel suberenulatum.

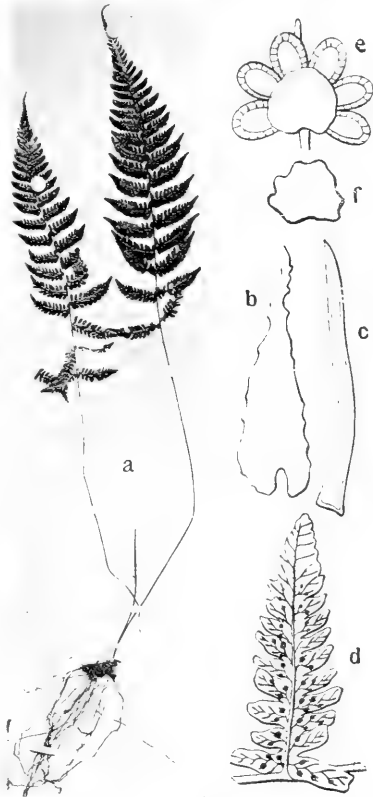


Fig. 121, *Dryopteris* (*Lastrea*) *sublaxa* HAYATA; a, the plant; b, a scale on the rhizome; c, a hair on the costule of a pinna; d, a pinna; e, a sorus; f, an indusium with more crenate margin.

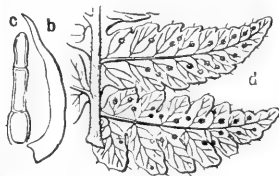
HAB. Arisan, leg. B. HAYATA, 1912, Jan.

Near *D. laxa*, but differs from it by the not ciliate indusium and less hairy fronds.

***Dryopteris (Ctenitis) tenuifrons* HAYATA sp. nov.** (Fig. 122). Rhizoma?



Stipes 40 cm. longus parce squamatus, squamis lanceolatis 4 mm. longis 1 mm. latis, sub lente pubescens. Frons longe triangularis 60 cm. longa 40 cm. lata apice triangulari-acuminata basi in ambitu obtriangulari-acuta inferiore bipinnata, pinnis inferioribus a se 8-10 cm. remotis a rhachibus  $70^{\circ}$ - $90^{\circ}$  divaricatis, pinnis infimis triangularibus 20 cm. longis basi totiusque latis apice triangulari-acutis breve petiolatis (petiolis 1 cm. longis) inaequilateralibus latere superiore 8 cm. latis, latere inferiore 14 cm. latis, pinnulis inferioribus a se 3 cm. remotis a costa pinnae angulo  $80^{\circ}$ - $90^{\circ}$  divaricatis, pinnulis infimis (latere inferiore) longissimis superioribus gradatim brevioribus, infimis longissimis lineari-lanceolatis 14 cm. longis 3 cm. latis apice acuminatis basi truncatis latis-  
simis breve petiolatis vel sessilibus pinnatifidis vel pinnatilobis, lobis lineari-oblongis 17 mm. longis 6 mm. latis apice obtusis



margine crenulatis, crenulis  $\pm$  ascendentibus; stipites, rhaches costaeque toto castaneo-rubescens; frons

Fig. 122, *Dryopteris tenuifrons* HAYATA; a, the plant; b, a scale on the stipe; c, a hair on the costa of a pinna; d, a portion of a pinna. textura tenuissime herbaceo-membranacea supra plus minus pubescens, pilis

pluricellularibus. Sori utroque latere costulae loborum prope marginem 1-seriatim dispositi.

HAB. Kōtōshō,  
leg. T. KAWAKAMI et  
S. SASAKI, Juli., 1912.

**Dryopteris**(*Eudryopteris*) **thrichorhachis** HAYATA sp. nov. (Fig. 123). Rhizoma? Stipes 70 cm. longus basi dense sursum parce squamatus castaneo-rubescens, squamis inferioribus latioribus lanceolatis 1-2 cm. longis 2-4 mm. latis apice subulato-acuminatis castaneo-nigricantibus validiusculis patentibus, squamis superioribus angustioribus linearibus vel setiformibus patentissimis; rhachis straminea squamis setiformibus ubique dispersa, squamis persistentibus patentissimis. Fronds ovato-triangularis 66 cm. longa 50-55 cm. lata apice tenuissime



Fig. 123, *Dryopteris thrichorhachis* HAYATA; a, the type specimen; b, a younger specimen; c, a scale on the stipe; d, a hair on the upper side of a costa of a pinnule; e, a hair on the under side of a costa of the same pinnule; f, an upper pinnule of the younger specimen, seen from below; g, the same, seen from above; h, a second pinnule of the middle pinna; i, a sorus.

acuminata basi in ambitu obtusa tripinnata, pinnis inferioribus angulo 45° a rhachibus divaricatis a se 10–15 cm. remotis, infimis longissimis triangulari-lanceolatis 40 cm. longis 15 cm. latis apice tenuissime acuminatis (acuminibus linearibus serratis) latere superiore angustioribus latere inferiore latoribus, pinnulis infimis (latere superiore) lanceolatis 7 cm. longis 2 cm. latis, ab axillis rhachis frondis 2 cm. remotis, pinnulis infimis (latere inferiore) ab axillis 10 cm. remotis lanceolatis 12 cm. longis 3 cm. latis apice tenuissime

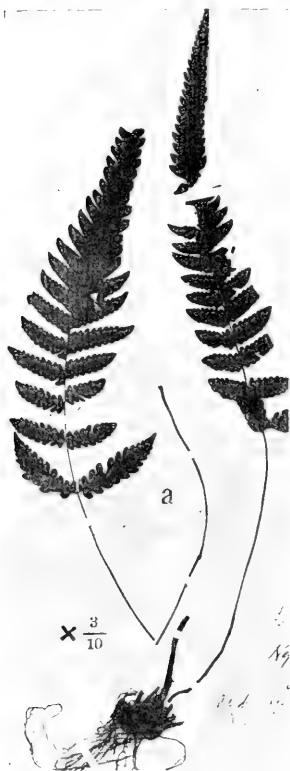


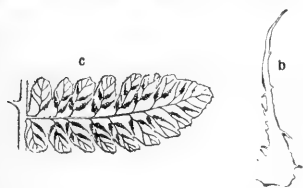
Fig. 124-A, *Dryopteris* (*Leptogramma*) *africana* C. Chr.; a, the plant.

acuminatis basi truncatis, petiolulis 3 mm. longis, pinnulis ordinis secundarii infimis triangulari-oblongis 18 mm. longis 1 cm. latis apice obtusis basi subtruncatis sessilibus vel brevissime petiolulatis pinnatifidis, segmentis longe rectangularibus 8 mm. longis 2–3 mm. latis apice rotundatis margine integris vel obscure crenulatis, pinnulis inferioribus a se 3 cm. remotis, a rhachibus pinnarum angulo 80°–90° divaricatis. Textura rigide herbacea, pagina supra pauce ad costulas vel venulas pilis setiformibus dispersa, costulis supra canaliculatis subtus elevatis, subtus pilis minutis tenuissimis dispersis, venis venulis supra non visis subtus distincte visis leviter elevatis pilis minutis tenuissimis dispersis. Sori versus apicem pinnularum ordinis secundarii vel segmentorum pinnularum ordinis secundarii siti.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Very near *Lastrea spectabilis* WALL. (BEDD. Handb. Fer. Brit. Ind. p. 257, fig. 132 = *D. Hendersoni* C. Chr.). The smaller, perhaps younger form in the accompanying figures above given accords pretty well with

BEDDOME'S figures, save the position of the sori which are in our specimens all located only towards the apex of the pinnules or of the segments of the latter. I am hesitating to regard this fern as distinct from *L. spectabilis*.



**Dryopteris** (*Leptogramma*) **africana** (DESV.) (Fig. 124, A-B.) C. CH. IND. 251. *Nephrodium Totta* DIELS.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with Fig. 124-B, *Dryopteris africana* C. a specimen so large; b, a scale on the rhizome; c, a pinna. belled in the Tōkyō herbarium. I am merely following C. CHRISTENSEN'S Index in taking *D. africana* for this fern.

**Dryopteris** (*Eudryopteris*) **transmorrisonensis** HAYATA n. n. *Polystichum transmorrisonense* HAYATA Mater. Fl. Formos. p. 427.

HAB. In monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. Mori, Oct., 1906, (No. 2502).

**Dryopteris** (*Eudryopteris*) **Yabei** HAYATA (Fig. 125), Mater. Fl. Formos. p. 424. Stipites rubescentes 30 cm. longi basi squamati (squamis linearibus nigricantibus 1-1½ cm. longis vel brevioribus rubescentibus) supra bisulcati basi 4 mm. lati ad totam longitudinem parvisse muricati. Frons in circumscriptione ovata 45 cm. longa 30 cm. lata apice cuspidata basi obtusa subglabra coriacea bipinnata, partibus infimis rarius subtripinnatis, pinnis mediis angus-

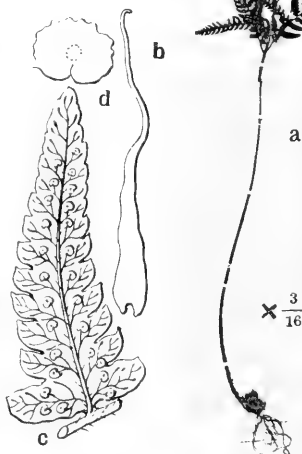


Fig. 125, *Dryopteris Yabei* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna; d, a sorus.

tato-lanceolatis 15 cm. longis basi latissimis 5 cm. latis apice acuminatis plus minus petiolatis, pinnis infimis conformibus longioribus latissimis, pinnis utroque latere rhachis frondis 15-16 inferioribus 5 cm. a se remotis, pinnis basi pinnatis sursum pinnatifidis, (segmentis falcato-recurvis apice acutis mediocribus  $1\frac{1}{2}$  cm. longis 4 mm. latis a basi contractis vel plus minus dilatatis margine obscure dentatis vel distincte dentatis); pagina supra viridis subtus pallidissime plus minus rubescens utraque glabra. Rhachis frondis supra bi-tri-sulcata piloso-squamata, squamis densiusculis rubris, subtus convexa minute parcellissime muricata; rhachis pinnarum complanata supra plano-sulcata glabra subtus elevata squamata, venis et venulis liberis. Sori secus venas loborum pinnarum vel pinnularum sub quoque dente siti ab apice dentium 2 mm. remoti, vel sursum ad sinus dentium siti. Indusium persistens orbiculari-cordatum  $1\frac{1}{2}$  mm. in diametro rubrum margine paucissime eroso-ciliolatum.

HAB. Kushaku et Shintengai, leg. K. MIYAKE, 1899.

Near *Nephrodium acutum* Hook., but differs from it by the shape of the lowest pinna.

***Dryopteris viridescens*** (BAKER) O. Ktze.; C. Ch. Ind. p. 300. *Nephrodium viridescens* BAKER Syn. p. 275.

HAB. Arisan, 7000-8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō. This common Japanese fern is found in Formosa only in high elevations.

### *Aspidium* Sw.

***Aspidium submembranaceum*** HAYATA sp. nov. (Fig. 126). Rhizoma? Stipes 30 cm. longus nitidus basi purpureo-nigrescens vel atro-castaneus sursum  $\pm$  rubescens basi densissime squamatus, squamis linearibus rubro-castaneis usque 2 cm. longis 1 mm. latis margine remote ciliatis vel non ciliatis. Frons in ambitu ovato-cordata 30 cm. longa 18 cm. lata bipinnata apice acuta basi in ambitu cordata, pinnis oppositis a rhachibus frondis angulo  $70^{\circ}$ - $80^{\circ}$  divaricatis, inferioribus a se 5 cm. remotis, infimis triangularibus arcuatis inaequilateralibus 16 cm. longis 13 cm. latis, latere superiore basi 4 cm. latis, latere inferiore latioribus basi 9 cm. latis apice arcuato-acuminatis basi latis-



simis truncatis pinnatis pinnulis infimis latere superiore ab axillis 7 mm. distantibus 4 cm. longis, pinnulis infimis (latere inferiore) ab axillis 2 cm. remotis 10 cm. longis 3 cm. latis apice acuminatis lanceolatis basi truncatis sessilibus



Fig. 126, *Aspidium submembranaceum* HAYATA; a, a pinnule,  $\times 2$ .

usque ad  $\frac{2}{3}$  pinnatifidis, (rhachibus 6 mm. latis), segmentis rectangularibus apice obtusis 11 mm. longis 5 mm. latis margine denticulatis; venis anastomosantibus, areolis costalibus linearibus angustissimis; pagina membranacea in exsiccatu rubescens utraque pilis minutis brevissimis parcissime dispersa, costulis venis venulisque supra elevatis distincte visis subtus subplanis; inter segmenta vel lobos pinnularum dentibus minutis  $\frac{1}{4}$  mm. longis sitis. Sori prope apicem vel prope marginem loborum vel segmentorum siti.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juli., 1912.

Very near *Dictyopteris chattagrammica*

BEDD. (*Aspidium membranifolium* Ktze.),

BEDD. Handb. Fern. Brit. Ind. p. 300, fig. 155.

***Aspidium subtriphyllum* Hook. form. *cuspidatopinnatum* (Fig. 127).**

HAB. Prope Botansha, leg. K. MIYAKE, Jan., 1900.

This fern is extremely variable. Our specimens here figured are so widely different from the type of

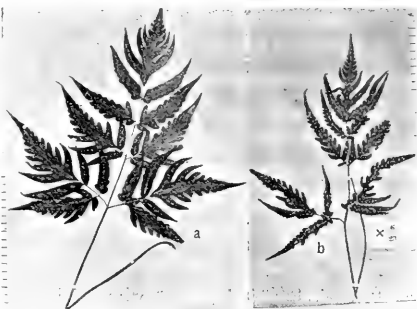
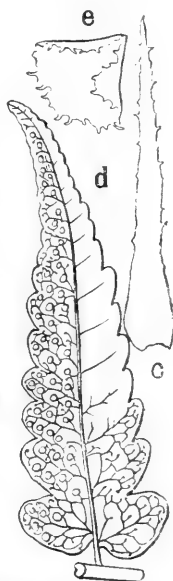


Fig. 127, *Aspidium subtriphyllum* Hook. form. *cuspidatopinnatum*; a, the plant, sterile frond; b, the same, fertile frond; c, a scale on the stipe; d, a pinnule; e, an indusium.



*A. subtriphyllum* that it should otherwise claim to be a distinct species.

*Polystichum* ROTH.

***Polystichum aculeatum*** ROTH.; HAYATA et MATSUM. Enum. Pl. Formos. p. 581.

HAB. Mt. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

***Polystichum atroviridissimum*** HAYATA sp. nov. (Fig. 128). Rhizoma erectum. Stipes 25 cm. longus basi spathulato-dilatatus squamatus, squamis

inferioribus linearibus superioribus ovatis paleaceis apice cuspidato-acuminatis basi rotundatis 7 mm. longis 3 mm. latis margine remotissime setulosus. Frons sterilis longe lineari-lanceolata 40-50 cm. longa 6-7 cm. lata medio latissima basi minus lata apice acuminatissima, acuminibus linearibus, pinnis mediis a se 13 mm. remotis longissimis sursum minoribus ad dentes 3 mm. longos reductis, pinnis fere horizontaliter patentibus, mediis  $3\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  cm. latis oblique lanceolatis plus minus falcatis apice aristato-acutis basi oblique truncatis latere superiore latissimis basi auriculato-truncatis (auriculis 1 cm. longis cum rhachibus

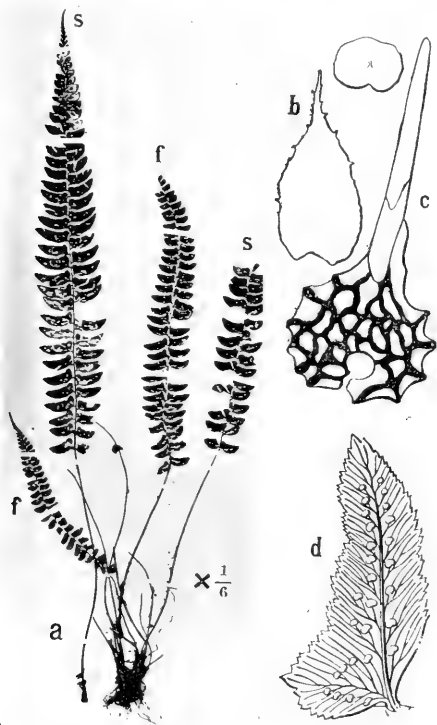


Fig. 128, *Polystichum atroviridissimum* HAYATA; a, the plant, s=sterile fronds, f=fertile fronds; b, a scale on the rhizome; c, a scale on the lower surface of a pinna; d, a pinna; e, a sorus.

parallelis), basi inferiore cuneato-acutis sessilibus vel brevissime petiolatis margine aristato-serrulatis; rhachis supra sulcata tenuis squamata, costis venis pinnae tenuissimis utraque pagine elevatis distinctis; pagina supra nitida atroviridissima glabra subtus regulariter secus venas venulas costulasque squamis minutis oblecta, squamis persistentibus subrubris  $\frac{1}{10}$  mm. latis cuspidato-rotundatis denticulatis basi cordatis; textura tenuiter coriacea. Frons fertilis quam sterili minora lanceolata 30 cm. longa 4-5 cm. lata subtus soris utroque latere costae fere uniseriatim dense instructa. Pinnae steriles et fertiles margine tenuiter albo-marginatae. Indusium peltatum rotundatum margine irregulariter crenato-integrum  $1\frac{1}{2}$  mm. in diametro.

HAB. In monte Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

**Polystichum constantissimum** HAYATA sp. nov. (Fig. 129). *Dryopteris constantissima* HAYATA in sched Herb. Taihoku. Rhizoma? Stipes 30 cm. longus fusco-stramineus basi squamatus, squamis nigricantibus, in magnitudine variabilibus majoribus lanceolatis linearibus vel ovatis acuminatissimis basi auriculato-cordatis vel truncatis 6-7 mm.

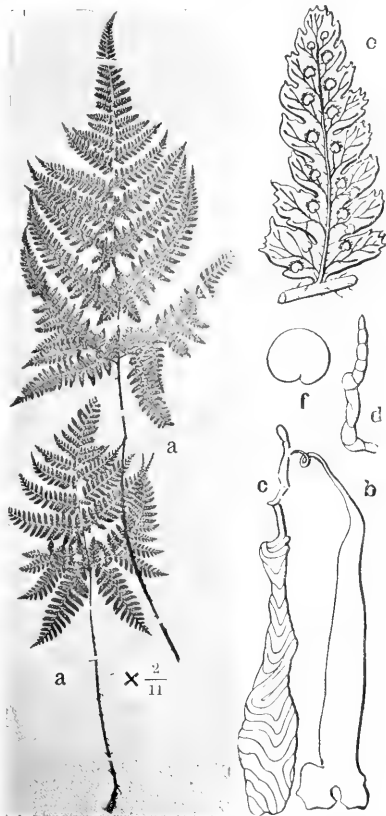


Fig. 129, *Polystichum constantissimum* HAYATA; a, the plant; b, a scale at the base of the stipe; c, one of the smallest scales on the stipe; d, a hair on the under surface of the frond; e, a pinna; f, an indusium.

longis, minoribus  $1\frac{1}{2}$  mm. longis. Frons in ambitu cordata apice acuminata basi cordata tripinnata 35 cm. longa 20–23 cm. lata, pinnis infimis longissimis 16 cm. longis breve petiolatis oblique cuspidato-triangularibus apice acuminatis basi oblique truncatis latissimis 13 cm. latis, (pinnulis infimis ordinis primarii latere inferiore longissimis 11 cm. longis, iis infimis latere superiore 3 cm. longis) pinnulis infimis ordinis primarii latere inferiore 11 cm. longis 3 cm. latis apice acuminatis basi plus minus rotundatis sessilibus, pinnulis infimis latere superiore 3 cm. longis triangulari-ovatis apice obtusis basi truncato-cuneatis sessilibus, pinnulis infimis ordinis secundarii triangulari-oblongis sessilibus margine lobulatis, lobis ascendento-patentibus infimis oblongis 4 mm. longis  $2\frac{1}{2}$ –3 mm. latis margine remote aristato-serrulatis; pagina subtus toto (exceptis pin-

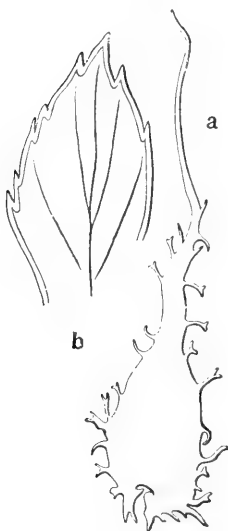


Fig. 130, *Polystichum falcatipinnum* HAYATA; a, one of the smallest scales on the stipes; b, a portion of a pinna.

nulis inferioribus pinnarum infimarum) sorifera; rhachis frondis et pinnarum supra profunde sulcata superiore anguste canaliculata squamata, costulis pinnularum supra canaliculatis subtus elevatis, venis lateralibus supra non visis subtus plus minus visis; pagina coriacea margine aristata supra glabra subtus minute pilosa, pilis minute  $\frac{1}{3}$  mm. longis, squamis ad rhachin pinnarum vel pinnularum basi sacciferis.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *P. varium* Pr.; but differs from it by the very much unequal sided lowest pinnæ with the longer lowest pinnules on the lower side, which pinnules are as twice long as the next pinnules.

***Polystichum falcatipinnum* HAYATA sp. nov.** (Fig. 130). Rhizoma erecto-ascendens cum reliquis stipitem 5 cm. in diametro. Stipes 20 cm. longus frondibus brevior, squamis variabilibus linearibus vel lanceolatis latioribus vel angustioribus, majoribus  $1\frac{1}{2}$  cm. longis 4–5 mm. latis apice cuspidatis, minoribus lanceolatis cus-

pidatis 2 mm. longis  $\frac{1}{2}$  mm. latis margine ciliatis. Frons lanceolata 40-60 cm. longa 10 cm. lata apice acuminatissima medio latissima basi minus lata 6 cm. lata pinnata, pinnis mediis longissimis deorsum paullo brevioribus sursum gradatim brevioribus in acumine ad dentem reductis, pinnis mediis longissimis 6 cm. longis 2 cm. latis lanceolatis apice aristato-acuminatis basi latissimis brevissime petiolatis (petiolis 2 mm. longis) pinnatifidis, basi latere superiore latioribus auriculato-truncatis, basi latere inferiore cuneato-acutis, deorsum pinnatifidis, pinnulis latere superiore basilaribus auriculiformibus 13 mm. longis 6-7 mm. latis oblique ovatis apice in ambitu obtusis margine aristato-serrulatis sed latere inferiore integris, pinnulis vel lobis juxta lobum infimum valde minoribus sursum ad dentem reductis (dentibus aristatis), margine tenuiter cartilagineo-albo-marginatis. Sori utroque latere costæ 1-seriatim dispositi; rhachis frondis squamata, squamis linearibus; costa pinnae supra canaliculata subtus leviter elevata, venis supra non visis subtus tenuiter distinctis; pagina coriacea supra nitida viridissima subtus glauca supra parce squamis minutis dispersa, subtus secus venas venulas regulariter squamata, squamis minutis cuspidato-ovatis  $\frac{1}{10}$  mm. latis.

HAB. Arisan, ad 7-8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

**Polystichum globisorum** HAYATA sp. nov. (Fig. 131). Rhizoma erecto-ascendens, apice cum reliquis stipitem 3 cm. in diametro. Stipes 50 cm. longus basi densissime squamatus, squamis fulvo-castaneis longe filiformi-linearibus 1 cm. vel plus longis  $1\frac{1}{2}$  mm. latis apice filiformibus basi oblique cordatis vel truncatis margine remota obscure setulosis vel subintegris, superiore subglabratus cum rhachibus stramineo-rubescens. Frons in ambitu cordato-pentagona 50 cm. longa 43 cm. lata apice ambitu triangulari-acuta subito-acuminata basi ambitu cordata quadripinnatifida, pinnis infimis longissimis tripinnatifidis 30 cm. longis 23 cm. latis subtriangularibus basi latissimis, apice acuminatis (petiolis 2 cm. longis), pinnulis infimis latere inferiore longissimis ea altera multo longioribus 18 cm. longis 6-7 cm. latis pyramidalilanceolatis apice acuminatis (acuminibus linearibus serrulatis) basi latissimis (petiolulis 1 cm. longis), pinnulis ordinis secundarii infimis (latere inferiore) longissimis triangulari-oblongis  $4\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  cm. latis apice acutis basi obliquis (petiolulis 2-3 mm. longis) pinnatifidis, segmentis infimis (latere su-

periore) longissimis rhomboideo-ovatis  $1\frac{1}{2}$  cm. longis 7 mm. latis apice aristato-acutis basi oblique cuneatis margine serratis vel duplicato-serratis, serris apice aristatis tenuiter cartilagineo-marginatis, segmentis pinnularum ordinis secundarii sursum ad dentem reductis; pinnis inferioribus a se

10–5 cm. remotis, superioribus gradatim reductis, pinnulis ordinis primarii pinnæ infimæ a se 4 cm. remotis, pinnulis ordinis secundarii inferioribus a se 2 cm. remotis; pagina supra nitida viridissima glabra subtus glabrata vel paucissime squamata, squamis minutis linearibus; textura tenuiter coriacea; pinnis a rhachibus frondis, pinnulis a rhachibus pinnæ angulo  $45^\circ$  divaricatis, sed pinnulis infimis a rhachibus pinnæ angulo recto divaricatis; rhaches frondes et pinnæ supra profunde sulcatæ sursum canaliculatæ, latere canaliculorum costulato-elevatæ, costulis

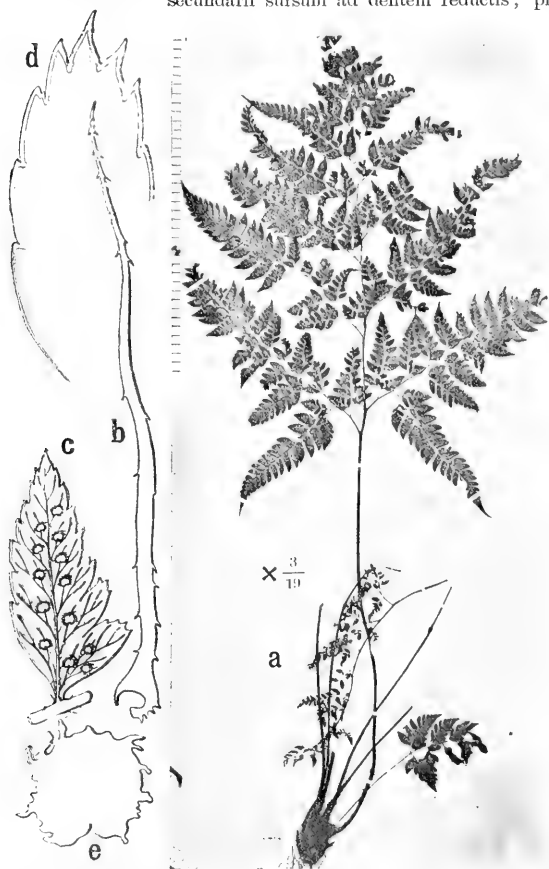


Fig. 131, *Polystichum globosorum* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule; d, margin of the same; e, an indusium.

pinnularum ordinis secundarii supra canaliculatis, venis lateralibus supra impressis vel non visis infra plus minus distinctis. Sori ad totam paginam (exceptis apicibus pinnæ et pinnulæ) utroque latere costulæ 1-seriatim dispositi globoso-cordati  $1\frac{1}{2}$  mm. in diametro globoso-elevati. Indusium rotundato-cordatum margine denticulatum.

HAB. Arisan, ad 7000–8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *P. laserpitiifolium*, but differs from it by the far much larger fronds with reflexed basal pinnules.

**Polystichum horridipinnum** HAYATA sp. nov. (Fig. 132). Rhizoma erectum vel ascendens cum reliquis stipitum 3 cm. in diametro sectionis apice frondes caespitosim gerens. Stipes 4 cm. longus dense squamatus, squamis in magnitudine variabilibus 3 mm.–10 mm. longis cuspidato-ovatis usque ad lanceolatis apice acuminatis crispato-recurvis basi ad insertionem minute cordatis minute auriculatis vel haud auriculatis tenuissimis membranaceis mar-

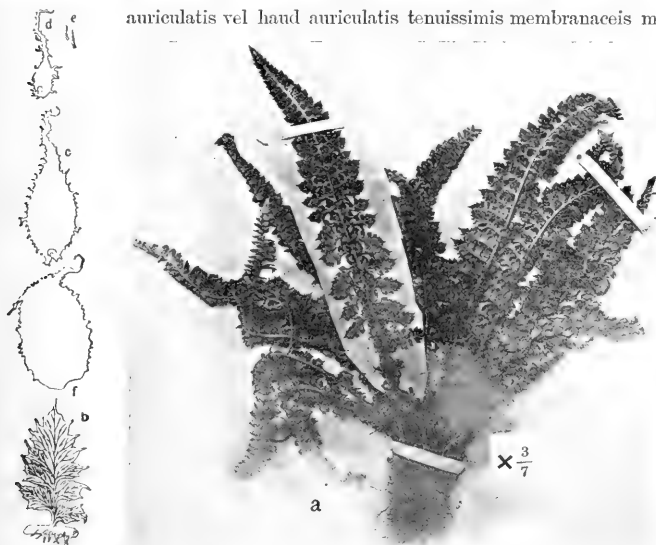


Fig. 132, *Polystichum horridipinnum* HAYATA; a, the plant; b, a pinna; c, d, e, various kinds of scales on the rhizome, stipe or rachis; e, scales on the lower surface of the frond.

gine irregulariter ciliato-serrulatis vel denticulatis. Frons lanceolata 15 cm. longa 3 cm. lata apice aristato-acuminata basi latissima truncata pinnata, pinnis infimis longissimis superioribus gradatim minoribus, inferioribus a se ad insertionem 1 cm. remotis vix vel haud imbricatis pinnatifidis, infimis triangulari-oblongis vel lanceolatis 2 cm. longis 12 mm. latis apice aristato-acutis basi truncatis latissimis sessilibus pinnatifidis obliquis latere superiore latioribus, segmentis infimis oblique rotundato-ovatis apice aristato-triangulari-acutis basi cuneatis margine 1-2 dentibus aristatis instructis, aristis validis  $1\frac{1}{2}$  mm. longis. Textura valde crasso-coriacea, pagina supra nitida glabra viridissima subtus pallida parce squamata, squamis interdum piliformibus crispatis. Rhachis frondis supra latiuscule sulcata, inferiore subtus  $\pm$  squamata, superiore glabra supra toto glabra, costis et venis pinnarum supra impressis subtus subimpressis distincte visis. Frons a medio usque ad apicem sorifera.

HAB. Montibus centralibus, leg. U. MORI, 1909, Dec.

Near *Aspidium Lonchitis* (LOWE Brit. Exot. Fern, VI. t. 22) in the outline and size of the fronds; still nearer *Polystichum ilicifolium* DOX (BEDD. Fern. Brit. Ind. p. 206, fig. n. 103). The latter may be proved to be identical with our fern, when close examination will be made with herbarium-materials.

**Polystichum integripinnum** HAYATA sp. nov. (Fig. 133) = *Aspidium integripinnum* HAYATA. Rhizoma? Stipes? Frons pyramidal-lanceolata 73 cm. longa infra medium latissima 30 cm. lata basi minus lata 25 cm. lata superiore angustior apice subito acuminata (acumine lineari) simpliciter pinnata, pinnis inferioribus longissimis 7 cm. a se remotis angulo  $45^\circ$  divaricatis lineari-lanceolatis circ. 20 cm. longis 24 mm. latis apice acuminatis basi  $\pm$  latioribus subito acutis sessilibus obliquis latere superiore latioribus basi leviter auriculiforme dilatatis margine integris vel obscure undulatis sursum serrulatis rectis, pinnis superioribus gradatim minoribus versus summum ad dentem abeuntibus  $\pm$  falcatis. Rhachis frondis recta squamata, squamis oblongo-lanceolatis lanceolatis 2-6 mm. longis apice cuspidatis acuminatis basi profunde cordatis (lobis cordis imbricatis) margine fimbriato-ciliolatis, costa pinnae supra tenuiter impressa subtus elevata, venis lateralibus utraque pagine non visis vel subtus vix visis, venis lateralibus a costa  $45^\circ$  divaricatis 4-5 mm. a se remotis ramosis versus marginem anastomosantibus areolas formantibus, areolis cum



venulis liberis; pagina frondis supra glabra subtus ad costam et ad paginam squamata, squamis costæ ea rhachis subsimilibus, squamis paginae amœboi-

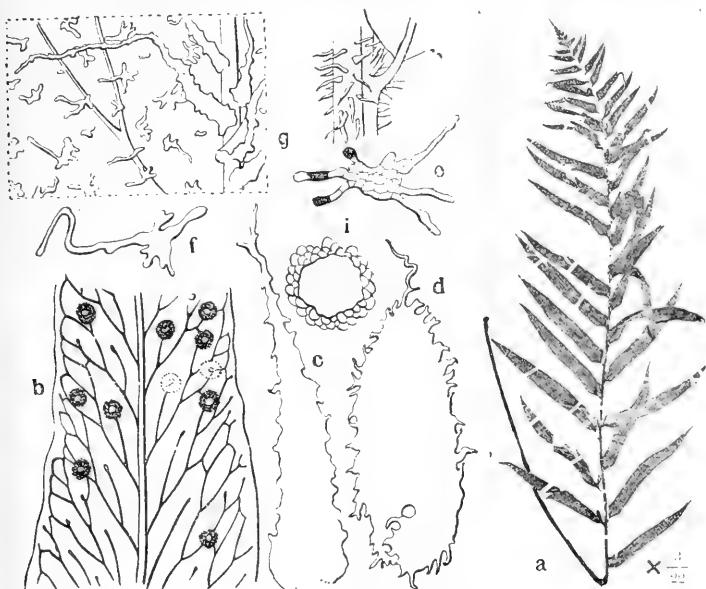


Fig. 133, *Polystichum integripinnum* HAYATA; a, the plant; b, a portion of a pinna, c, a scale on the stipe; d, a scale on the rachis of the frond; e, f, scales on the under surface of a pinna; g, a portion of the under surface of a pinna; h, a portion of the rachis; i, a sorus.

deis multiradiatis in forma variabilissimis. Textura herbaceo-coriacea. Sori a medio sursum frondis irregulariter dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Most near *Aspidium caducum* WALL. (HOOK. et GREV. Ic. Fil. t. 171); but differs from it by the much longer fronds with nearly entire narrower pinnae. The fern is as well referable to *Aspidium* as to *Polystichum*. Also somewhat resembles *Polystichum loucheitoides* (CHRIST) DIELS (Herb. Corea. tested by Dr. T. NAKAI), but differs from it by the not auricled pinnae with entire margin.

***Polystichum prionolepis* HAYATA sp. nov. (Fig. 134).** Rhizoma erecto-

ascendens. Stipes 20 cm. longus frondem æquans basi densissime squamatus superiore minus dense squamatus, squamis castaneis dimorphis, squamis basis stipitum linearibus vel filiformi-linearibus circ. 12 mm. longis acuminatis  $\frac{1}{2}$ -1 mm. latis, squamis in medio stipitum latoribus lanceolatis ovatis 12-15 mm. longis 2-3-4 mm. latis apice cuspidatis (cuspidibus



Fig. 134, *Polystichum prionolepis* HAYATA; a, the plant; b, a scale on the stipe; c, the margin of the same; d, a scale on the rhachis; e, margin of the same; f, a scale on the lower surface of a pinna; g, a pinna.

filiformibus), generaliter squamis linearibus et ovatis intermixtis. Frons lanceolato-triangularis vel lanceolata in longitudine stipitem æquans 15-18 cm. longa 7-8 cm. lata apice acuminata basi latissima truncata pinnata, pinnis utroque latere circ. 16 a rhachibus frondis angulo recto divaricatis, pinnis infimis plus minus retrorsum reflexis longissimis 4 cm. longis 1 cm. latis a se  $1\frac{1}{2}$  cm. remotis oblique lanceolatis sessilibus apice aristato-acutis basi obliquis latere superiore recto-auriculatis, (auriculis vel dentibus infimis 8 mm. longis 7 mm. latis) latere inferiore cuneato-acutis margine grosse serrato-dentatis, dentibus subrotundatis aristato-apiculatis margine serrulatis superioribus gradatim minoribus ad serrulam simplicem reductis, pinnis superioribus gradatim minoribus sursum ad dentes reductis; rhachis frondis squamata, squamis linearibus castaneis; pagina frondis valde coriacea supra nitida glabra ad costam impressa minute fugacio-hirtellata subtus plus minus glauca minute pauceque squamifera. Sori utroque latere costæ 1- vel 2-seriatim dispositi.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912. Semewhat near *P. cespitosum* WALL. (HOOK. Sp. Fil. t. 213).

**Polystichum rectipinnum** HAYATA sp. nov. (Fig. 135). Rhizoma? Stipes 25-30 cm. longus toto densiuscule squamatus, squamis in forma variabilibus linearibus vel lanceolatis ovatis margine ciliato-denticulatis apice cuspidatis, iis ovatis 1 cm. longis 3 mm. latis castaneis. Frons sterilis lanceolato-triangularis vel lanceolata 35 cm. longa 15 cm. lata apice acuta basi subtruncata pinnata, pinnis inferioribus longissimis 8-9 cm. longis lanceolatis 8-9 cm. longis  $2\frac{1}{2}$  cm. latis sessilibus apice acuminatis basi oblique truncatis pinnatifidis vel inferiore pinnatis, pinnulis vel segmentis vel lobis infimis (latere superiore) maximis 10-12 mm. longis quadrangularibus 6 mm. latis valde obliquis latere superiore latioribus apice apiculato-aristato-acutis margine obscure crenatis vel subintegris, lobis superioribus minoribus brevioribus sursum ad dentem reductis, dentibus ascendentibus aristato-apiculatis; pinnis infimis retrorsum reflexis, mediis horizontaliter patentibus sursum plus minus descendentibus gradatim minoribus ad dentem reductis, inferioribus 1-2 cm. a se remotis subalternis; rhachis frondis supra sulcata squamata, squamis linearibus; costa pinnarum supra sulcata subtus elevata, venis

lateralibus supra non visis subtus plus minus elevatis distinctis; pagina coriacea. Frons fertilis quam eis sterilibus multo angustior lanceolato-pyramidalis quam stipite in longitudine brevior 25 cm. longa basi latissima 13 cm. lata pinnata, pinnis totis horizontaliter patentibus vel plus minus retrorsum reflexis, inferioribus 3 cm. a se remotis, superioribus minoribus sursum ad dentem reductis, infimis longissimis lanceolatis 6-7 cm. longis 23 mm. latis apice

acuminatis basi oblique truncatis sessilibus pinnatis vel pinnatifidis, pinnulis infimis latere superioribus longissimis cum rhachibus frondium parallelis oblongo-lanceolatis 12 mm. longis 4-5 mm. latis apice aristato-apiculatis basi oblique auriculato-truncatis latere superiore valde latoribus margine obscure denticulatis vel subintegris. Pagina supra viridissima plus minus squamis linearibus instructa, subtus dense sorifera squamata. Sori utroque latere costulae pinnularum uni-seriatim a basi frondis usque ad apicem dense dispositi.

HAB. Arisan, ad 7000-8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

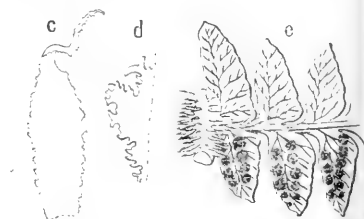


Fig. 135, *Polystichum rectipinnum* HAYATA; a, a sterile frond; b, fertile fronds; c, a scale of the stipe; d, margin of the same; e, a portion of a pinna.

**Polystichum Tsus-Simene** J. Sm. Compared with a Japanese specimen in the Tōkyō herbarium.

HAB. Arisan: prope Senninbora, leg. B. HAYATA et T. ITŌ, Mart., 1914.

*Gymnopteris* BERNH.

**Gymnopteris dichotomophlebia** HAYATA sp. nov. (Fig. 136). Rhizoma repens 2-3 mm. in diametro squamis dense obtectum, squamis cordato-ovatis apice obtusis vel acutis 2-3 mm. longis basi alte cordatis (lobis cordis profunde imbricatis) apice obtusis vel acuminatis. Stipes cum rhizomate continuus haud articulatus. Frons sterilis cum stipitibus lanceolata vel elliptico-lanceolata 20-25 cm. longa 3-3½ cm. lata apice triangulari-obtusa basi gradatim angustata attenuata ad stipitem brevissimum 3-4 mm. longum abeuns, margine integra membranacea in exsiccatō pellucida distincte venosa, costis tenuibus utraque pagine distincte elevatis, venis lateralibus plerumque dichotome ramosis reticulato-anastomosantibus (areolis costalibus subtriangularibus 7-8 mm. longis venulam liberam singulam furcato-ramosam includentibus), venis venulisque utraque pagine distincte elevatis tenuibus; pagina membranaceo-chartacea margine integra vel sensim repanda. Frons fertilis longe stipitata, stipitibus tenuibus fronde æquilongis 27 cm. longis

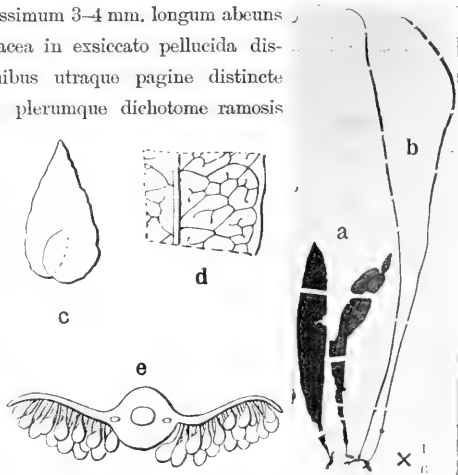


Fig. 136, *Gymnopteris dichotomophlebia* HAYATA; a sterile fronds of the plant; b, fertile fronds; c, a scale on the rhizome; d, portion of a sterile frond; e, cross section of a fertile frond.

glabris subcomplanatis 1½ mm. in diametro. Lamina angustissime linearis stipitem æquans vel brevior 23 cm. longa 3-3½ mm. lata apice acuminata basi gradatim attenuata ad stipitem abeuns supra glabra, costa elevata, margine integra leviter desuper recurva subtus toto sorifera; paraphyses lineares apice plus minus clavatiæ.

HAB. Hainan, leg. Z. KATSUMADA, 1911.

*Leptochilus dichotomophlebia* HAYATA in sched. herb. Taihoku.

Near *Gymnopteris variabilis* (BEDD. Fern. Brit. Ind. t. 272 and Handb. Fern. Brit. Ind. p. 429, fig. 258), but differs from that by the lanceolate sterile fronds which are in our species much obtuse at the apex and are gradually attenuated towards the base, and by the very short stipes; also near *Gymnopteris Feci* MOORE (BEDD. Fern. South Ind. t. 48), but differs from it by the linear fertile fronds. Lateral veins in our fern are nearly feathery towards the apex, but usually dichotomously branched downwards. Whether the stipes are articulated to the rhizomes or not is very questionable. There are seen faint lines, in which they are articulated, at the very base of the stipes. The lines, however, are not clear so as to decide the existence of articulation by themselves.

*Nephrolepis* SCHOTT.

***Nephrolepis tenuissimum*** HAYATA sp. nov. (Fig. 137). Rhizoma ascendens vel subrepens densiuscule foliosum, cum reliquis stipitum  $1\frac{1}{2}$  cm. in diametro. Stipes basi dilatatus nigricans supra basin sursum castaneo-stramineus basi densiuscule squamatus sursum gradatim glabratus, (squamis nigro-castaneis triangulari-lanceolatis basi plus minus rotundatis margine integris vel obscure remote denticulatis apice acuminatis usque 3-4 mm. longis  $1-\frac{1}{2}$  mm. latis) usque 10 cm. longus gracillimus erectus supra profunde sulcatus plus minus minute pilosus vel subglabratus. Frons lanceolata usque 20 cm. longa 5 cm. lata apice tenuissime attenuato-acuminata (acuminibus linearibus) basi leviter angustior simpliciter pinnata, pinnis mediis horizontaliter patentibus longissimis a se 1 cm. remotis 22 mm. longis 6 mm. latis oblique oblongo-linearibus apice obtusis basi latere superiore auriculato-productis (auricula triangulari-oblonga latere interiore 8 mm. longa latere exteriori 4 mm. longa apice rotundata basi latissima 4 mm. lata margine obscure denticulata) basi latere inferiore cuneato-acutis breve petiolatis (petiolo 1 mm. longo) margine obtuse remoteque obscure serrulatis, pinnis inferioribus plus minus reflexis plus minus gradatim brevioribus, infimis 18 mm. longis, superioribus gradatim brevioribus plus minus ascendentibus versus summum ad dentes 3 mm. longos abeuntibus; rhachis frondis glanduloso-hirsuta, pilis uni-

cellularibus brevissimis apice plus minus clavatis, supra canaliculata, petiolis pinnarum supra canaliculatis cum rhachibus frondium articulatis; textura membranacea ad marginem valde tenuissima, costis venis venulis utraque pagine planis subtus leviter elevatis distincte visis parce pilis glandularibus uni-



Fig. 137. *Nephrolepis tenuissima* HAYATA; a, the plant; f, a scale on the rhizome; c, a part of a rhachis with a petiole; d, a glandular hair on the same; e, a pinna; b, a sorus; g, an indusium.

cellularibus instructis; pagina supra fusco-viridis subtile pallidior. Sori medio inter costam et marginem utroque latere costæ pinnæ vel costulæ auriculæ pinnæ 1-seriatim dispositi rotundati. Indusium rotundatum ad basin adnatum margine eroso-denticulatum  $1\frac{1}{2}$  mm. latum latius quam longius.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

General aspect of this new species is just the same as that of *Dryopteris*. But the relationship of this fern and *Arthropteris ramosa* is very close in the venation, sori and especially in the glandular hairs on the rachis. Our fern differs from that genus only in having unarticulated fronds. So far as I am aware, this is the most tiny form of all the known species of *Nephrolepis*.

*Davallia* SM.

*Davallia stenolepis* HAYATA sp. nov. (Fig. 138). Rhizoma repens

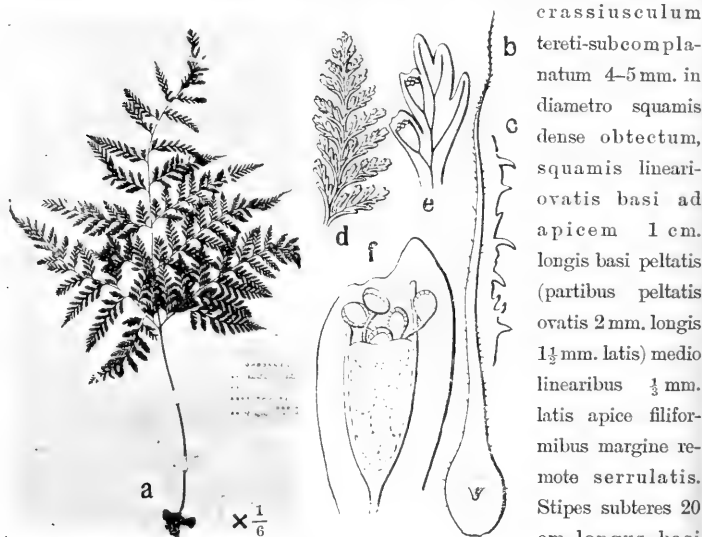


Fig. 138, *Davallia stenolepis* HAYATA; a, the plant; b, a scale on the rhizome; c, margin of the same; d, a pinna; e, a portion of the same; f, a sorus.

crassiusculum tereti-subcomplanatum 4-5 mm. in diametro squamis dense obtectum, squamis lineari-ovatis basi ad apicem 1 cm. longis basi peltatis (partibus peltatis ovatis 2 mm. longis  $1\frac{1}{2}$  mm. latis) medio linearibus  $\frac{1}{3}$  mm. latis apice filiformibus margine remote serrulatis. Stipes subteres 20 cm. longus basi plus minus squamatus supra basin



toto glaber. Frons triangulari-rhomboidea 30-40 cm. longa totiusque lata quadripinnatifida vel tripinnata (pinnis ordinis tertii pinnatifidis) apice triangulari-acuta, pinnis inferioribus a se 5-6 cm. remotis a costa angulo 60° divaricatis; pinna infima 20 cm. longa oblique triangulari 14 cm. lata apice acuminatissima breve petiolata, pinnulis I. infimis triangulari-lanceolatis 8 cm. longis 4-5 cm. latis a se 3 cm. remotis breve petiolulatis, pinnulis II. oblongis 2½ cm. longis brevissime petiolulatis pinnatifidis, segmentis infimis 8 mm. longis inciso-lobatis, lobis oblongis 1-2 mm. longis apice obtusis vel acutis; rhachis pinnae tenuiter alata; textura herbaceo-membranacea utraque pagine glabra.

HAB. Taitō: Daironkōsha, leg. U. MORI, 1908, Nov. (No. 2359); Musha (No. 2408); Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *D. bullata* WALL., but differs from it by the thinner texture and by the shape of the sorus-bearing lobes.

*Leucostegia* PRESL.

*Leucostegia parvipinnula* HAYATA n. n. (Fig. 139). *Davallia parvi-*

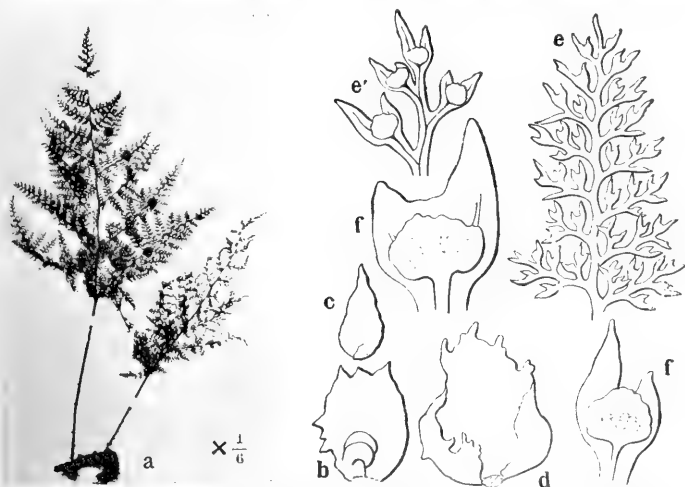


Fig. 139, *Davallia parvipinnula* HAYATA; a, the plant; b, a scale on the rhizome; c, a scale on the stipe; d, a stipule-like scale on the ramification of a pinnule; e, a portion of a pinnule; e', a portion of the same; f, a segment of an ultimate pinnule with a sorus; f', another segment of the same.

*pinnula* HAYATA Mater. Fl. Formos. p. 431. *Davallia Clarkei* HAYATA in Tōkyō Bot. Mag. XXIII. p. 27 (non BAKER).

HAB. Mt. Arisan; epiphyta ad truncos *Chamæcyparis* et *Taiwanica*, leg. S. SASAKI, Mai., 1913.

Stipites 14 cm. longi glabri stramineo-rubescences basi plus minus purpurascens subteretes (supra) profunde 1-sulcati sursum 2-3-sulcati glabri laud squamati basi parce squamati, squamis elongato-triangularibus tenuibus leviter rubescentibus margine erosis apice obtusis. Frondes triangulares 19 cm. longæ basi 20 cm. latæ, pinnis utroque latere 15, infimis 3-pinnatis 10 cm. longis, inferioribus bi-pinnatis 6-7-8 cm. longis a se 3-4 cm. remotis, superioribus brevioribus simpliciter pinnatis 3-4 cm. longis a se 1-2 cm. remotis, sursum minoribus 3 mm.-1 cm. longis a se 3 mm. remotis; pinnis infimis sessilibus lanceolato-ovatis 10 cm. longis  $4\frac{1}{2}$  cm. latis, latere inferiore latiore  $2\frac{1}{2}$  cm. lato; pinnulis I. infimis brevioribus, (inferioribus longioribus sessilibus angustato-quadrangularibus a se 1-2 cm. remotis pinnatis); pinnulis II. ovatis inferioribus 6 mm. longis obtusis angustatis remote profundeque pinnatifidis, segmentis angustissimis remotis cochlearibus bicornutis cum cornibus 1-3 mm. longis  $1-\frac{1}{4}$  mm. latis basi stipitatis, (cornibus exterioribus longioribus interioribus brevioribus), sinibus inter cornua rotundatis; rhaches frondium supra leviter tenuissime bisulcatæ subtus convexæ utrinque glabræ; rhaches pinnarum subcomplanatæ supra plus minus sulcatæ subulatæ; paginæ membranacæ utraque glabræ. Sori ad sinus furcæ venularum vel interdum ad angulos venularum flexarum ad centrum segmentorum pinnularum II. siti solitarii. Indusium semiglobosum  $\frac{3}{4}$  mm. latum  $\frac{1}{2}$  mm. longum basi leviter cordatum vel truncatum.

In addition to the original description, I may mention the following characters which are most important, so far as the modern pteridology is concerned. The rhizomes are creeping like that of *Davallia* and *Humata*, but the stipes are never inserted by articulation on the rhizomes. The fronds have scales which are very like stipules in flowering plants, on the point of ramification of pinnae, pinnules and segments, as is the case with *Acrophorus*.

The habit of this fern is extremely like that of *Davallia*. It is impossible to separate this species from that genus but for the difference of fructification

and the absence of articulation on the rhizomes. The present fern is somewhat near *Loxoscaphe gibberosum* MOORE (BAKER Syn. Filic. p. 100) from which it is distinguishable in having much narrower pinnules. It is, as I stated in my former paper, most closely allied to *Davallia Clarkei* BAKER (= *Humata Hookeri* DIELS = *Acrophorus Hookeri* MOORE) in its pinnatifidation of fronds and its subcordate indusia. So far as is concerned the delimitation of *Humata*, *Davallia* and *Acrophorus*, as stated by Prof. L. DIELS in ENGL. u. PRANTL Natur. Pfl.-fam., the present fern is different from *Davallia* in its having inarticulated stipes (which are not joined on the rhizome) and subcordate indusium. It comes nearer to *Humata* in its subcordate indusia and creeping rhizomes, but it is separable from that genus by the inarticulated stipes. It resembles *Acrophorus* in the inarticulated stipes, subcordate indusia, and in the presence of stipules, but widely different from that genus in the ramification of fronds, venation and in its creeping rhizomes. If these latter characters should necessitate the separation of our fern from *Acrophorus*, and the inarticulated stipes from *Humata*, it should constitute a special genus, *Leucostegia* PRESL. to which *Leucostegia immersa* and others are referred. Through the courtesy of Mr. E. D. MERRILL, I was so very fortunate as to know the opinion of Dr. COPELAND who was so kind as to send me the following note on this plant. According to Dr. COPELAND "this fern is congeneric with *Davallia athamantica* CHRIST, *Acrophorus Hookeri* MOORE (*Leucostegia*, BEDD., *Davallia Clarkei* BAKER), *Acrophorus pseudo-cystopteris* MOORE (*Leucostegia*, BEDD., *Davallia*, KZE.) and *Leucostegia pulchra* J. SM. (*Davallia*, DON, *Acrophorus*, MOORE). I would call it *Leucostegia* n. sp. None of the above species has a functional articulation of the stipe. And the base of some stipes of HAYATA's fern shows a vestigial articulation. The fern is related to *Davallia*, but not nearly to *Acrophorus*. The chaff at the base of the pinnae does indeed suggest *Acrophorus* strongly, but this is only an accidental resemblance. There are no such thickenings of the rhachis as in *Acrophorus* and its relatives *Diacalpe*, *Monachosorum* etc., and frond form and rhizome are very different."

***Microlepia* PRESL.**

***Microlepia grandissima* HAYATA sp. nov.** (Fig. 140). Rhizoma?

Stipes 90–100 cm. longus stramineus nitidus basi 1 cm. in diametro. Frons in ambitu triangularis bipinnata circ. 100 cm. longa 90 cm. lata apice triangulari-acuta, pinnis infimis longissimis, superioribus gradatim brevioribus



Fig. 140, *Microlepia granulissima* HAYATA; a, the plant; b, a portion of a pinnule; c, a portion of the same; d, the same, with indusium.

sursum ad segmenta pinnæ terminalis abeuntibus, pinnis infimis 60 cm. longis oblique cuspidato-triangularibus basi 30–40 cm. latis apice cuspidato-acuminatis basi triangulari-acutis petiolatis, petiolis 3 cm. longis, pinnulis infimis (lateris inferioris) longissimis, pinnulis superioribus gradatim brevioribus ad

segmenta pinnulæ terminalis abeuntibus, pinnulis infimis 5 cm. a se remotis petiolulatis (petiolulis 2 cm. longis) triangulari-lanceolatis 22 cm. longis 8 cm. latis apice recto-acuminatis basi latissimis triangulari-truncatis deorsum fere ad rhachin inciso-lobatis sursum dentatis, segmentis vel lobis infimis triangulari-ovatis 4 cm. longis 2 cm. latis plus minus falcatis vel rectis apice acutis latere superiore latoribus margine subcartilagineo-marginatis serratis, serris acutis, segmentis lobis superioribus gradatim minoribus apice acutis vel obtusis sursum rotundatis gradatim minoribus sursum ad crenam reductis; pinnis inferioribus a se 25 cm. remotis, a rhachibus angulo 60° divaricatis; rhachis frondis inferiore recta sed superiore repando-flexuosa, rhachis pinnularum et costa segmentorum repando-flexuosa superne non elevata dense hirsuta (pilis recurvis brevissimis) subtus elevata glabra, costis segmentorum a rhachibus pinnularum angulo acuto divaricatis, venis lateralibus supra non visis subtus tenuissime elevatis distinctis liberis simplicibus vel furcatis, venulis rectis; pagina superne glabra nitida viridis subtus sub lente pilis minutis parcissime dispersa; textura membranacea vel tenuiter coriacea. Sori sub serris singulis lorum solitariter siti ab apice serrarum 2-1 mm. distantes venulas terminantes. Indusium reniforme 2 mm. latum 1 mm. longum margine superiore liberum crenulatum margine inferiore adnatum.

HAB. Arisan: Arisan-Tōzan, ad 8-9000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

*Humata grandissima* HAYATA in sched. herb. Taihoku.

Near *Davallia platyphylla* DON (HOOK. et BAKER Syn. Fil. p. 99. = *Microlepia platyphylla* (MOORE) BEDD. Fer. South Ind. t. 13) and *D. loucheidei* WALL. Hk. Sp. Fil. I. p. 173 t. 46, Brit. Exot. Fern. t. 19; but differs from them by the much larger fronds with more shallowly lobed pinnæ and pinnules. The sori are very much like those of *Humata*. The specimen lacking rhizomes, it is at present impossible to decide whether this is referable to *Microlepia* or *Humata*.

***Microlepia subpinnata*** HAYATA, sp. nov. (Fig. 141). Rhizoma subrepens teres 2-3 mm. in diametro pilis obtectum, pilis rubro-castaneis  $\frac{1}{2}$  mm.-1 mm. longis. Stipes 20 cm. longus intus (supra) profunde sulcatus subglabratus brevissime hirsutus. Frons ovato-lanceolata 50 cm. longa 24 cm. lata apice acuminata basi obtusa ad medium latissima subbipinnata vel

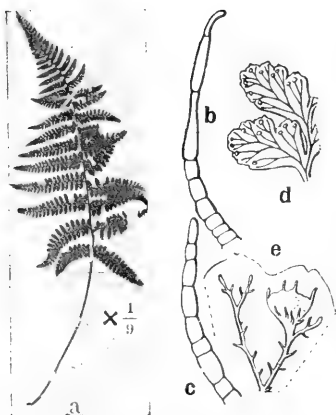


Fig. 141, *Microlepia subpinnata* HAYATA; a, the plant; b, c, hairs on the rhizome; d, a part of a pinna; e, a portion of a pinnule.

1899.

Near *M. Speluncæ*, but differs from it by the bipinnate fronds with subentire or lobed pinnules.

***Microlepia trichocarpa* HAYATA**  
sp. nov. (Fig. 142). Rhizoma? Stipes 25 cm. longus teres basi 3-4 mm. latus patento-hirsutus intus (supra) profunde sulcatus, pilis patentissimis 1-3 mm. longis pluricellularibus. Frons ovato-lanceolata apice acuto-acuminata infra medium latissima basi minus lata basi abrupte truncata 40-50 cm. longa 22 cm. lata bipinnata, pinnis longissimis lineari-lanceolatis 12 cm. longis 3 cm. latis angulo recto a costa divaricatis apice acuminato-obtusis (a se 3 cm.

bipinnatifida, pinnis mediis lanceolatis 12 cm. longis basi latissimis  $3\frac{1}{2}$  cm. latis sessilibus apice acuminatis a se 4-5 cm. remotis, pinnulis inferioribus oblique quadrangularibus 2 cm. longis 1 cm. latis apice obtusissimis basi cuneato-acutis sessilibus basi obliquis margine lobulatis truncatis vel subrotundatis; rhachis, costa vel costula supra glabra profunde sulcata subtus densissime brevissime hirsuta, pilis subadpressis; textura membranacea tenuissima brevissime hirsuta vel subglabrata. Sori submarginales vel a margine  $\frac{1}{2}$ -1 mm. distantes.

HAB. Rahō, leg. K. MIYAKE, Oct.



Fig. 142, *Microlepia trichocarpa* HAYATA; a, the plant; b, a hair on the stipe; c, a pinnule; d, a portion of the same.

remotis basi truncatis subsessilibus vel breve petiolatis, (petiolis 3 mm. longis), pinnulis quadrangulato-oblongis  $1\frac{1}{2}$  cm. longis 7 mm. latis apice rotundato-obtusis basi latere superiore lato truncatis latere inferiore anguste acutis ad petiolulum 1 mm. longum abeuntibus vel sessilibus duplicato-lobulatis, lobis vel lobulis rotundato-obtusis brevissimis; rhachis, costa vel costula toto hirsuta; textura membranacea tenuis utraque pagine hirsuta. Sori marginales ad sinus lobulorum approximati. Indusium cupuliforme pilosum margine libero ciliatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *M. subpinnata* HAYATA, but differs from it by the setulose indusium and very much more hirsute fronds.

*Lindsaya* DRY.

***Lindsaya kusukusensis*** HAYATA sp. nov. (Fig. 143). Rhizoma repens tenue teres 1 mm. in diametro parce squamatum, squamis lineari-filiformibus vel piliformibus non adpressis 1 mm. longis castaneis. Stipes 5 cm. longus  $\frac{2}{3}$  mm. in diametro glaber tenuis intus (supra) leviter sulcatus. Frons linearis 30 cm. longa  $1\frac{1}{2}$  cm. lata apice gradatim attenuata obtusa basi gradatim attenuata pinnata, pinnis utroque latere 50-60, mediis semi-lunaribus

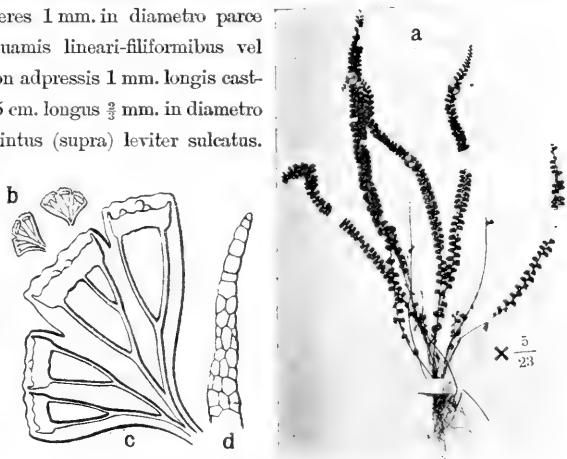


Fig. 143, *Lindsaya kusukusensis* HAYATA; a, the plant; b, pinna; c, a pinna; d, a scale on the rhizome.

$\frac{1}{2}$  cm. a se remotis 7 mm. longis 5 mm. latis unilateralibus latere superiore lato rotundatis (basi latere superiore truncatis 4 mm. longis) basi subito cuneatis ad petiolulum subnullum abeuntibus margine remote leviter lobulatis, lobulis

latissimis 3 mm. latis  $\frac{3}{4}$  mm. longis apice truncatis; venis subfurcatis; textura membranacea. Sori in lobulis singulis solitarii latissimi marginales.

HAB. KUSUKUSU, Jun. 1912, leg. B. HAYATA et S. SASAKI.

Near *L. cultrata* Sw., but differs from it by the much narrower and longer fronds with smaller and broader pinnæ; also allied to *Lindsaya linearis* Sw. (in KUNZE Farnkräuter I. t. 16-1) and *Lindsaya gracilis* = *Lindsaya securifolia* PRESL. (KUNZE Farnkräuter I., t. 85-1), in the linear lanceolate simple pinnate fronds. Perhaps a form of *L. cultrata*, Sw.

*Diplazium* Sw.

***Diplazium arisanense*** HAYATA sp. nov. (Fig. 144). Rhizoma ascendens erectum. Stipes tenuis 30 cm. longus teres 2 mm. latus basi squamatus sursum glabratus, squamis castaneis linearibus lanceolatis usque 8 mm. longis usque  $1\frac{1}{2}$  mm. latis. Frons 40 cm. longa 16 cm. lata ovato-lanceolata apice acuminata basi in ambitu rotundata bipinnata vel bipinnatifida, pinnis infimis minus longis, mediis longissimis lanceolatis 13 cm. longis  $3\frac{1}{2}$  cm. latis apice acuminatissimis basi latissimis truncatis

pinnatis vel pinnatifidis subsessilibus vel inferioribus brevissime petiolatis, pinnulis infimis longissimis ovato-oblongis  $2\frac{1}{2}$  cm. longis 13 mm.

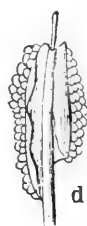
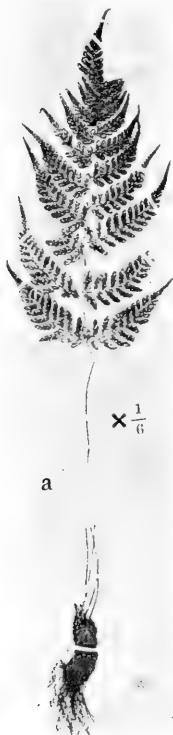


Fig. 144, *Diplazium arisanense* HAYATA; a, the plant; b, a portion of a pinna; c, a sorus of the *Athyrium*-type; d, another sorus of the *Diplazium*-type.

latis apice in ambitu obtusis basi late cuneatis ad insertionem 3 mm. latis sessilibus paullo inaequalateralibus margine leviter lobulatis, lobulis paucis



serratis, serris acutis ascendentibus, vel pinnulis sursum serratis, serris acutis ; textura herbacea ; pinnæ a rhachibus frondium  $50^{\circ}$ – $60^{\circ}$  divaricatæ ascendentorecurvæ, pinnis inferioribus a se  $4\frac{1}{2}$  cm. remotis, pinnulis inferioribus a se 1 cm. remotis ; costa pinnarum sursum supra canaliculata secus canaliculum utroque remote setulosa, setulis circ. 1 mm. longis. Sori secus costulam utroque latere uniseriatim dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

### **Diplazium**

#### **costalisorum**

HAYATA sp. nov.

(Fig. 145). Rhizoma ? Stipes

40 cm. longus

parce squamatus

fusco-stramineus.

Fronstriangularis

60 cm. longa

totiusque lata

apice in ambitu

triangulacuta

ad summum

cuspidata basi

latissima bipin-

nata, pinnis in-

fimis longissimis

30 cm. longis 16

cm. latis ovato-

oblongis apice

cuspidato-acumi-

natis, (acumini-

bis linearibus

2–3 cm. longis 3

mm. latis ob-



Fig. 145, *Diplazium costalisorum* HAYATA; a, the plant; b, apical portion of a pinnule; c, a pinnule; d, a sorus of the *Allantodia* type

secre dentatis vel subintegris) basi obtusis (petiolis 3 cm. longis), pinnulis mediis longissimis 7 cm. longis, inferioribus brevioribus 5 cm. longis totis lanceolatis sessilibus æquilateralibus apice acuminatis basi truncatis margine (excepto acumine) regulariter lobulatis, lobulis quadrangularibus 7 mm. longis 5 mm. latis apice truncatis margine subintegris; textura coriacea; pinnis a rhachibus frondium angulo 50° divaricatis, pinnulis a rhachibus pinnarum angulo 70°-90° divaricatis; pinnis inferioribus a se 10 cm. remotis, pinnulis inferioribus a se 2 cm. remotis. Sori secus prope costulas utroque latere uni-seriatim siti oblongo-lineares 3-4 mm. longi 1 mm. lati elevati.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juli., 1912.

**Diplazium isobasis** CHRIST Bull. Herb. Bois. 2<sup>m</sup> série IV. (1904) p. 618.

HAB. in declivitalibus humidis Takao, leg. U. FAURIE, Aprili. 1903.

**Diplazium bicuspe** HAYATA sp. nov. (Fig. 146). *Asplenium bicuspe* HAYATA. Rhizoma erectum breve. Stipes cæspitosus erectus 4 cm. longus complanatus 2 mm. latus squamatus, squamis fusco-nigrescentibus lineari-lanceolatis 3 mm. longis  $\frac{1}{3}$  mm. latis apice subulato-acuminatis basi truncatis. Frons lanceolata vel oblanceolata vel lineari-lanceolata 28-30 cm. longa 2 cm. vel 2 $\frac{1}{2}$  cm. lata apice acuminata sæpe 2-3 lobata, (lobis cuspidiformibus triangularibus apice acuminatis, acuminibus recurvis vel erectis), basi gradatim longe attenuata ad stipitem abeuns margine irregulariter undulata vel remote denticulata vel subintegra; textura herbacea crassiuscula supra viridis subtus pallidior supra glabra subtus deorsum parce minute squamata vel subglabra sursum glabra, costa utraque pagine complanata elevata, venis et venulis utraque pagine non visis. Sori secus costam utroque latere 1-seriatim dispositi lineares a costa 1 mm., a margine 2-3 mm. distantes.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Very near *Asplenium ensiforme* WALL. (HOOK. et GR. Ic. Fil. t. 71) and *Asplenium apoense* COPELAND, but differs from them by the entire involucres and in having fronds which are sometimes 2-4-lobed at the apex. The sori of this fern are usually of the *Asplenium*-type, but sometimes are of the *Diplazium*-or *Scolopendrium*-type.



Fig. 146, *Diplazium bicuspe* HAYATA; a, the plant; b, a scale at the base of the stipe; c, a portion of the frond; d, a portion of the same, showing two kinds of indusia.

***Diplazium Kawakamii* HAYATA** (Fig. 147). Mater. Fl. Formos. p. 435. Stipites 55 cm. longi complanato-tetragoni 4-sulcati basi 7 mm. lati fuscentes tota longitudine dense piloso-squamati, (squamis linearibus incrassatis sub-teretibus plus minus complanatis basi muricatis fuscentibus plus minus crispatis 3-4 mm. longis patento-reflexis vel depresso-reflexis). Frondes

late ovatæ 87 cm. longæ 60 cm. latæ apice acutæ basi obtusæ tripinnatæ superiore bi-pinnatæ, pinnis lanceolatis utroque latere 10 a rhachibus frondium angulo 40°-60° divaricatis inferioribus 40-45 cm. longis a se 13-17 cm.



Fig. 147, *Diplazium Kawakamii* HAYATA; a, the plant of a tripinnate form; b, the plant of a bipinnate form; c, viscid hairs on the stipe; d, a pinnule; e, a sorus of the *Allantodia*-type.

remotis, pinnis infimis longissimis 45 cm. longis 17 cm. latis apice acuminatis obtusis longe vel breve petiolatis (petiolis 3-4 cm. longis), remote

pinnatis, pinnulis I. utroque latere 20 inferioribus 5 cm. a se remotis ovato-lanceolatis 10 cm. longis 33 mm. latis apice acuminatis (acuminibus linearibus) basi obtusis breve petiolulatis (petiolulis 3 mm. longis) etiamque pinnatis, pinnulis II. utroque latere 18 inferioribus a se 8 mm. remotis lanceolatis  $1\frac{1}{2}$  cm. longis 6 mm. latis apice obtusis basi obtusis prope basin latissimis basi constrictis 2 mm. latis latere inferiore plus minus decurrentibus margine truncato-dentatis, (dentibus utroque latere 8 infimis longissimis obtusis interdum paucissime serratis 3 mm. longis 2 mm. latis apice truncatis ascendentibus); pinnulis I. apice attenuato-acuminatis dentato-lobulatis, lobulis vel dentibus truncatis ascendentibus; rhachis frondium complanato-tetragonæ supra et subtus late leviter sulcatæ vel simpliciter concavæ basi 4 mm. latæ inferiore dense superiore paucissime squamatæ, squamis fusculibus filiformibus patento-reflexis; rhachis pinnarum complanatæ sub-tetragonæ supra sulcatæ utroque latere sulcorum elevato-alatæ subtus convexæ stramineæ subglabræ; rhachis pinnularum complanatæ supra sulcatæ subtus elevatæ latere alatæ etiamque secus sulcos utroque latere prominente verticaliterque alatæ (alis secus sulcos hæc atque illæ interruptis  $\frac{3}{4}$  mm. latis); paginæ exsiccatæ supra fuscentes glabræ subtus plus minus pallidiores subglabræ, venis et venulis supra impressis subtus leviter elevatis. Sori juxta costam sub quoque dente singuli ad venulas unilaterales sed ad basin venularum bilaterales oblongi prominentes  $1\frac{1}{2}$  mm. longi  $\frac{3}{4}$  mm. lati utrinque obtusi.

HAB. Tōsan, leg. T. KAWAKAMI et G. NAKAHARA, 1906.

**Diplazium leiopodum** HAYATA sp. nov. (Fig. 148). Rhizoma ascendento-erectum. Stipes cespitosus 16 cm. longus basi squamatus sursum glabratus purpureo-cinereus vel cinereus, squamis lanceolatis linearibus acuminatis nigricantibus 6 mm. longis  $\frac{3}{4}$  mm. latis. Frons triangulari-lanceolata 20 cm. longa basi latissima 11 cm. lata apice gradatim caudato-acuminata basi truncata bipinnata vel sursum pinnata, pinnis mediis angulo recto a rhachibus divaricatis a se 2 cm. remotis lanceolatis apice gradatim acuminatis basi truncatis subsessilibus 5 cm. longis  $1\frac{1}{2}$  cm. latis a medio basi æquilatis brevissime petiolatis versus basin pinnatis sursum lobulatis, lobulis gradatim versus summum ad serrulas abeuntibus, pinnulis

infinimis oblongis ovatis 8 mm. longis 5 mm. latis apice truncatis apice margineque



denticulatis basi subito late acutis sessilibus vel adnatis; pinnis infimis plus minus desuper reflexis; textura membranaceo-coriacea: costae pinnarum supra leviter canaliculatae utroque latere interrupte 1-costulatae, costulis remote setulosi; costae supra glabrae, subtus pilis unicellularibus glandulosi obtectae; venis venulisque supra non elevatis subtus elevatis. Sori utroque latere costulae pinnularum et loborum 1-seriatim dispositi semi-oblongi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. tenuicaule* HAYATA, but distinguishable only by the indusia which are in *D.*

Fig. 148, *Diplazium leiopodium* HAYATA; b, a scale on the rhizome; c, a lobe of an upper pinna; d, an indusium of the *Athyrium*-type.

*leciopodium* denticulate, while in *D. tenuicaulis* they are nearly entire.

**Diplazium subrigescens**

HAYATA sp. nov.

(Fig. 149). *Athyrium subrigescens*

HAYATA in herb. Taihoku. Rhizoma ascen-

dento - erectum. Stipes usque ad

26 cm. longus albo - stramineus

basi nigrescens basi plus minus

lanceolato-dilatatus basi dense

superiore parce squamatus sur-

sum glabratus,

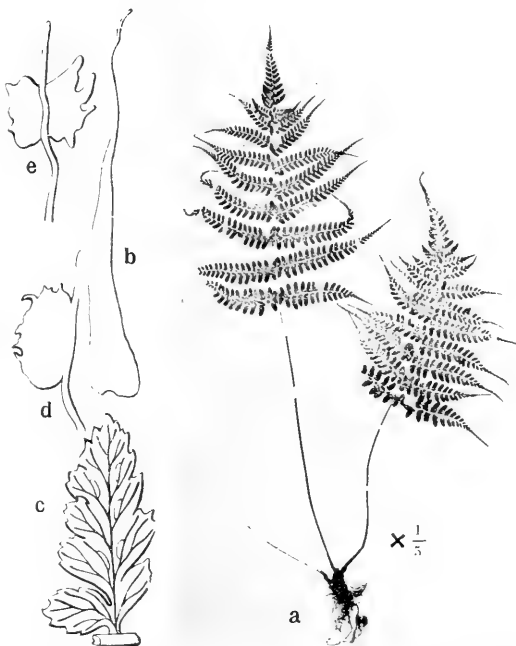


Fig. 149, *Diplazium subrigescens* HAYATA; a, the plant; b, a scale of the rhizome; c, a pinnule; d, an indusium of the *Athyrium*-type; e, another indusium of the *Diplazium*-type.

squamis inferioribus cuspidato-lanceolatis acuminatis basi cordato-rotundatis vel rotundatis margine integris usque 1 cm. longis usque 2 mm. latis nigrescentibus. Frons cuspidato-orata usque 25 cm. longa usque 20 cm. lata apice longe caudata a medio usque ad basin æquilata sursum subito ad caudam abeunus bipinnata, pinnis mediis vel basilaribus subæqualibus lanceolatis 10 cm. longis 2 cm. latis apice acuminatis acumine lineari tenuissimo 1-2 mm. lato basi sessilibus truncatis æquilateralibus, pinnulis sessilibus fere toto æquilongis, mediis oblique oblongis vel semitriangularibus 1 cm. longis 5 mm. latis latere superiore auriculatis latere inferiore cuneatis margine duplicato-dentatis vel serrulatis,

apice in ambitu obtusis vel rotundatis serrulatis, serrulis pinnularum acutis.



Fig. 150, *Diplazium tenuicaule* HAYATA; a, the plant; b, a pinnule (upper one); c, a sorus of the *Allantodia*-type.

Rhachis frondis albo-straminea supra sulcata in sulcis  $\pm$  pubescens; rhachis pinnae anguste canaliculata in canaliculo  $\pm$  pubescens supra remote alternatim setulosa; costula pinnularum supra impressa remote setulosa; pagina subherbacea rigescens utraque subglabra; pinnis a rhachibus frondis, pinnulis a rhachibus pinnae angulo  $80^{\circ}$ – $90^{\circ}$  egressis, pinnis inferioribus a se  $2\frac{1}{2}$  cm. remotis, pinnulis a se 5 mm. a se remotis. Sori secus costulam utroque latere 1-seriatim dispositi, latere singulo venae siti vel rarius utroque latere venae dispositi.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Allied to *Athyrium rigescens* MAKINO.

Whether this new fern and its allied species should be referred to *Athyrium* or *Diplazium*, is very questionable. The habit of these ferns is rather of the *Athyrium*-type, but the sori are sometimes of the *Diplazium*-type. Very remarkable for its having very long slender tails at the apex of the pinnae.

***Diplazium tenuicaule* HAYATA** sp. nov. (Fig. 150). Rhizoma? Stipes 20 cm. longus subglaber cineraceo-purpureo-purascens. Frons 30 cm. longa 16 cm. lata apice gradatim acuminata basi truncata pinnata vel bipinnatifida, pinnis medio basi æquilongis a se 3 cm. remotis



a rhachibus frondium angulo  $80^\circ$  egressis longe lanceolatis 9 cm. longis basi latissimis 3 cm. latis truncatis apice acuminatis pinnatis sursum pinnatifidis, lobulis versus summum ad serrulas abeuntibus, pinnulis infimis oblongo-rectangularibus 15 mm. longis 8 mm. latis apice rotundatis basi truncatis margine apiceque denticulatis latere lobulatis, lobulis apice denticulatis. Textura herbacea, pagina supra ad costam remote setulosa subtus ad costam pilis unicellularibus glandulosis oblecta, cæterum glabra. Sori secus costas pinnularum vel lorum utroque latere 1-seriatim dispositi.

HAB. In monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

**Diplazium Textori** (Miq.)

Compared with a specimen so labelled in the herbarium at Tōkyō.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Asplenium* LINN.**

***Asplenium adiantum nigrum* LINN.** (Fig. 151).

*Athyrium adiantum nigrum* (LINN.).

HAB. Montibus centralibus, leg. U. MOE, Dec. 1908. Observ.: Rhizoma erectum. Stipes caespitosus usque 7 cm. longus inferiore rubro-purpurascens sursum castaneus basi dense squamatus, squamis inferioribus rubro-atropurpurascens subulato-lanceolatis 5 mm. longis  $\frac{1}{2}$  mm. latis apice subulato-filiformibus basi angulato-rotundatis peltatis margine subintegræ, squamis superioribus filiformibus plus minus pilosis, sursum glaber. Frons triangulari-oblonga vel ovato-oblonga 10 cm. longa 7 cm. lata apice acuminata ad summum obtusa basi ambitu rotundata bipinnata vel tripinnatifida, pinnis inferioribus longissimis a se  $1\frac{1}{2}$  cm. remotis angulo  $45^\circ$ – $50^\circ$  a rhachibus egressis, infimis longissimis  $4\frac{1}{2}$  cm. longis  $2\frac{1}{2}$  cm. latis ovato-triangularibus apice lineari-acuminatis sed ad summum obtusis basi triangulari-acutis breve petiolatis (petiolis 3 mm. longis), rhachibus complanatis 1 mm. latis, pinnulis primariis inferioribus a se 6 mm. remotis angulo  $45^\circ$  a rhachibus egressis  $1\frac{1}{2}$  cm. longis 6 mm. latis triangulari-lanceolatis apice lineari-acuminatis ad summum obtusis basi cuneatis breve petiolulatis (petiolulis  $1\frac{1}{2}$  mm. longis) basi pinnatifidis, segmentis obovatis 4 mm. longis 2 mm. latis sursum margine serratis basi integris apice obtusissimis basi cuneatis; segmentis ultimis cum rhachibus pinnarum subæquilatis. Textura herbacea crassiuscula. Sori



Fig. 151, *Asplenium adnigrum* LINN; a, the plant; b, a scale; c, a pinnule; d, a sorus of the *Athyrium* type.

secus costulas pinnularum utroque latere 1-seriatim dispositi firme approximati lunulares vel interdum sursum firme recurvi.

Compared with an European specimen so labelled in the herbarium at Tōkyō. Perhaps one of the varieties of this species.

**Asplenium iridiphyllum** HAYATA sp. nov. (Fig. 152). Rhizoma erectum brevissime squamatum, squamis cuspidato-lanceolatis 6 mm. longis  $1\frac{1}{2}$  mm. latis apice cuspidatis basi rotundatis vel subpeltatis margine subintegris vel remote subdenticulatis. Stipes caespitosus brevissimus vel nullus basi squamatus, squamis subulato-lanceolatis 4 mm. longis  $\frac{1}{2}$  mm. latis apice subulatis basi rotundatis subpeltatis margine longe remoteque ciliatis fusco-castaneis. Frons lanceolata apice gradatim acuta ad summum obtusa basi attenuatissima ad stipitem brevissimum abeuns subsessilis 27 cm. longa 28 mm. lata margine irregulariter crenulata subundulato-plicata simplex versus apicem ascendento-denticulata supra glabra subtus presertim prope costam vel versus apicem squamis minutis parce dispersa, squamis irregularibus



Fig. 152, *Asplenium iridiphyllum* HAYATA; a, the plant; b, a scale on the rhizome; c, a scale on the stipe; d, e, amceoid scales on the under surface of the upper portion of the frond.



Fig. 153, *Asplenium lasiniatum* Dox: a, the plant; b, a scale on the rhizome; c, a pinna, seen from below; d, a gemmiferous pinna, seen from above; e, a gemma.

amceboideis multiradiatis 2 mm. in diametro fusco-nigricantibus; pagina superius parce squamata demum glabra, costis subtilis elevatis, venis venulis subtilis non visis. Textura rigide herbacea vel membranacea.

HAB. Shintiku: Goshōsan, leg. U. MORI, Juni., 1906.

The sori are usually of a kind of the *Asplenium*-type, but sometimes, though very rarely, present transitional forms towards the *Diplazium*-type. In this respect, the fern may also be referable to *Diplazium*.

***Asplenium lasiniatum* Dox;** (Fig. 153) HAYATA Fl. Mont. Formos. p. 243.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Asplenium Makinoi* HAYATA n. n.** (Fig. 154). *Diplazium Makinoi* YABE in sched. herb. Tōkyō, in MATSUM. et HAYATA Enum. Pl. Formos. p. 600. Rhizoma? Stipes 20-22 cm. longus

flavo-stramineus subglaber complanatus  $2\frac{1}{2}$  mm. latus parce squamatus, squamis lanceolatis 4 mm. longis nigricantibus. Frons 23 cm. longa totiusque lata in ambitu subrotundata apice in ambitu rotundata basi in ambitu acuto-truncata simpliciter pinnata, pinnis utroque latere 2-3, pinna terminali iis lateralibus conformi aequilonga lanceolata 14 cm. longa 21 mm. lata apice lineari-acuminata (acumine 2 cm. longo 1-2 mm. lato) basi subito attenuata ad petiolum abeunti (petiolo 2 cm. longo) margine irregulariter denticulato-crenulata tenuiter desuper angustissime recurva. Textura herbacea crassiuscula subtus pallidissima supra glabra subtus squamis cuspidato-ovatis vel amœboidalibus minutis parce dispersa pellicula, costis utraque pagine elevato-complanatis, venis venulis utraque pagine tenuissimis distincte visis, pinnis lateralibus subsessilibus vel brevissime petiolatis; rhachis angustissime alata. Sori prope costam secus costam 1-seriatim utroque latere dispositi a costa 2 mm., a margine 3-4 mm. remoti.

HAB. Utaisha, leg. S. SASAKI, Oct., 1910.

The fern was named several years ago by Mr. Y. YABE; but the author's original description has never been published. The above description is drawn from a specimen which is quite identical with the type. So far as I have examined, the sori are of the *Asplenium*-type, but not of the *Diplazium*-type.

Near *Asplenium Wightianum* WALL. figured in HOOKER Sp. Fil. III. p. 105 t. 167.

***Asplenium Matsumuræ* CHRIST.**

HAB. Tôtôshô, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912.

Compared with a co-type preserved in the herbarium at Tôkyô.

***Asplenium morrisonense* HAYATA n. n.**

*Asplenium laserpitiifolium* LAM. var. *morrisonense* HAYATA Mater. Fl. Formos. p. 438.

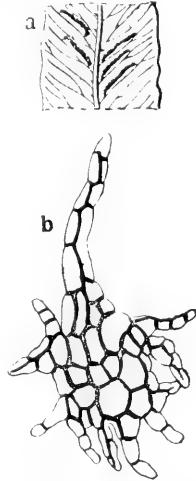


Fig. 154, *Asplenium Mukinoi* HAYATA; a, a portion of a pinna; b, as seen on the under surface of the frond.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Asplenium planicaule* WALL.**

HAB. Arisan, ad 7000-6000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō.

***Asplenium resectum* Sm. form. *adiantifrons* (Fig. 155).**

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

This form is so widely different from the ordinary one of *A. resectum* that I thought it to be a distinct species. But, examining closely, I have found that there are many transitional forms between this and the ordinary one.

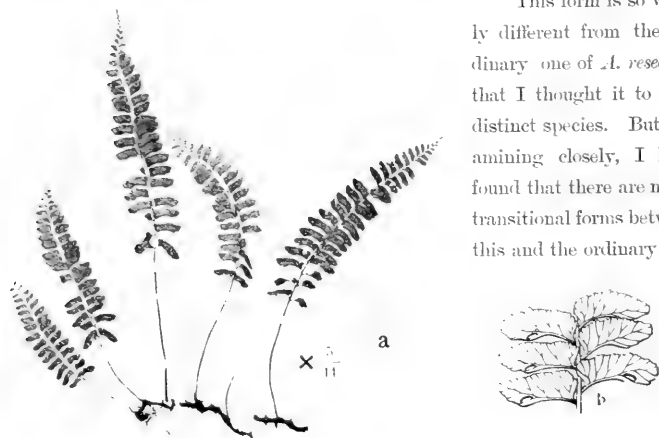


Fig. 155, *Asplenium resectum* Sm. form. *adiantifrons*; a, the plant; b, a portion of a frond.

This fern, therefore, though strikingly different from *A. resectum*, will not claim to be a distinct from the named species, nor even a variety of the latter.

***Asplenium ritoense* HAYATA sp. nov. (Fig. 156).** Rhizoma erectum? brevissimum apice squamis dense obtectum, squamis ovato-lanceolatis 2 mm. longis apice obtusis vel acuminatis basi leviter cordatis vel truncatis ferrugineo-nigris margine setulosis. Stipes 1½-2 cm. longus frondibus brevior basi plus minus squamifer toto longitudine (basi excepto) alatus cum alis 1½ mm. latus. Frons elongato-triangularis 3 cm. longa 18 mm. lata pinnatifida apice obtusa basi late truncata, segmentis inferioribus 5 mm. a se remotis late ovatis

9 mm. longis 7 mm. latis apice obtusis vel truncatis basi subito cuneatis subpetiolulatis inciso-lobatis, lobis brevissimis  $\pm$  acutis sorum singulorum gerentibus; rhachis frondium alata cum alis  $1\frac{1}{2}$  mm. lata; textura herbacea utraque pagine glabra, costis venis lateralibus supra distincte elevatis subtus non elevatis obscuris. Sori latere loborum singulo proxime siti. Inlusium lunulare margine uni-seriatim rubropunctatum  $1\frac{1}{3}$  mm. longum  $\frac{1}{2}$  mm. latum.

HAB. Mt. Ritôzan, ad 6500 ped.

alt., Ige. T. KAWAKAMI, Juli. 1913.

Near *A. davallioides* HOOK.

***Asplenium rutæfolium* KUNZE.**

*Asplenium prolongatum* HOOK. f.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Compared with a specimen so labelled in the Tōkyō herbarium.

***Asplenium scolopendrifrons* HAYATA sp. nov.** (Fig. 157). Rhizoma breve erectum squamatum, squamis cuspidato-lanceolatis fusco-caustaueis 3-4 mm. longis  $\frac{1}{2}$  mm. latis apice subulatis



Fig. 156. *Asplenium ritoruse* HAYATA; a, the plant; b, a frond; c, a scale on the rhizome; d, apical portion of a frond; e, another portion of the frond with an indusium before opening; f, margin of an indusium.



Fig. 157. *Asplenium scolopendrifrons* HAYATA; a, the plant; b, a scale on the rhizome; c, d, amochoidal scales on the lower surface of the frond; e, a portion of the frond; f, an indusium.

basi rotundatis subpeltatis margine remote dentato-ciliolatis vel subintegris. Frons oblanceolata 13 cm. longa 1½ cm. lata apice obtusa vel obtusissima basi longe attenuata ad stipitem brevissimum abeuntis margine tenuissime recurva irregulariter crenulata supra subglabra subtus parce squamis dispersa, squamis minutis amoeboideis multiradiatis ½ mm. in diametro. Textura herbacea. Sori lunulati secus costas prope marginem extensi approximati utroque latere 1-seriatim dispositi.

HAB. Arisan, leg. S. SASAKI.

Near *Asplenium scolopendrioides* J. Sm. but differs from it by the much smaller fronds with very obtuse apex.

**Asplenium tenuicaule** HAYATA sp. nov. (Fig. 158). Rhizoma erectum



Fig. 158, *Asplenium tenuicaule* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna.

brevissimum. Stipes caespitosus tenuissimus 5 cm. longus subtus (extus) atro-rubro-purpurascens basi squamatus sursum glabratus, squamis inferioribus cuspidato-lanceolatis 3 mm. longis ⅔ mm. latis basi cordato-decurrentibus rotundatis margine integris remote panceque glanduloso-ciliolatis vel obsoletis, superioribus linearibus minoribus. Frons lanceolata vel lineari-lanceolata 8 cm. longa 2 cm. lata apice acuminata basi obtusa bipinnatifida, pinnis oblongis 13 mm. longis 6 mm. latis apice obtusissimis basi cuneatis, petiolis 2 mm. longis, pinnulis obtriangularibus vel obovatis apice lobatis basi angusto-cuneatis, lobis acutis. Textura tenuissime herbacea. Sori lineares lunulati 3 mm. longi.

HAB. Arisan, ad 6000–7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.



Near *Asplenium pekinense* HANCE, but differs from it by the broader lobes of the pinnules.

***Asplenium tenuissimum*** HAYATA sp. nov. (Fig. 159). Rhizoma brevissimum erectum tenue. Stipes cuspidatus semiteres levis tenuissimus 15 cm. longus nitidus intus (supra) canaliculato-planus viridis subtus extus convexus nigro-rubro-purpurascens nitidissimus parce squamatus, squamis inferioribus cuspidatis 3 mm. longis basi 1 mm. latis, superioribus linearibus



Fig. 159. *Asplenium tenuissimum* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule; d, apical portion of the same with a sorus.

piliformibus 2-3 mm. longis rubro-purpurascens. Frons tenuissima herbacea viridissima lanceolata apice acuminata basi truncata 25 cm. longa 7½ cm. lata tripinnata vel tripinnatifida, pinnis oblongo-lanceolatis, inferioribus longioribus, infimis paullo brevioribus, mediis a se 1½ cm. remotis a rhachibus frondium angulo 70°-80° divaricatis oblongis vel oblongo-lanceolatis apice obtusis basi acutis vel oblique truncatis 3 cm. longis 1½ cm. latis latere superiore latioribus quam latere inferiore, pinnulis ordinis primarii infimis latere superiore

ab axilla 1-2 mm. remotis, a se 5 mm. remotis oblongis apice obtusis basi acutis 1 cm. longis 6 mm. latis, pinnulis ordinis secundarii oblongis integris vel 2-3 lobatis apice acutis basi emeatis 3-4 mm. longis 1-2 mm. latis. Sori sub lobo vel pinnula ordinis secundarii singuli humulares 1½ mm. longi.

HAB. Arisan, ad 6-7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *Asp. tenuifolium* DON. (HOOK. 2nd Cent. Fern. t. 29, BEDD. Fern. South Ind. t. 130, Handb. Fern. Brit. Ind. p. 161, fig. n. 78), but differs from it by the narrower fronds with much remoter pinnae.

***Asplenium unilaterale* LAM. var. *obliquissimum* HAYATA n. v.** (Fig.



FIG. 160-A, *Asplenium unilaterale* LAM. var. *obliquissimum* HAYATA; a, the plant.

160 A-B). Rhizoma repens teres tenuissimum  $1\frac{1}{2}$  mm. in diametro squamatum. Stipes usque 9 cm. longus nitidus fusco-purpurascens 1 mm. in diametro sectionis gracillimus glaber basi  $\pm$  squamatus. Frons lanceolata apice acuminatissima (acumine lineari) a medio usque ad basi æquilata basi subtruncata usque ad 17 cm. longa usque ad  $2\frac{1}{2}$  cm. lata pinnata, pinnis mediis inferioribus subæquilongis, superioribus minoribus versus apicem ad dentem brevem abentibus, pinnis inferioribus a se 8 mm. remotis angulo  $50^\circ$  a rhachibus frondium divaricatis oblique rectangularibus  $1\frac{1}{2}$  cm. longis 4 mm. latis versus apicem obtuso-æntis ad summum obtusis  $\pm$  ascendentibus basi acuto-cuneatis subsessilibus vel brevissime petiolatis valde inæquilateralibus, latere superiore basi 6 mm. lato, latere inferiore subnullo, margine superiore obscure crenatis margine inferiore subintegris; pagina utraque glabra tenuissime membranacea semihyalina. Sori a medio frondis sursum dispositi.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

This fern is of a form so strikingly different from ordinary one of the type. But, the transition from this extreme form to the ordinary one has led me to regard the former as a variety of the latter, or more likely as a mere form of the same species.

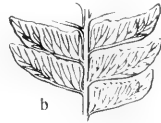


Fig. 160-B, b,  
a portion of the frond.

**Asplenium viridissimum** HAYATA sp. nov. (Fig. 161). Rhizoma? Stipes 40 cm. longus basi parce squamatus purpureo-virescens superne glabratus subviridescens, squamis angusto-linearibus 13 mm. longis  $1\frac{1}{2}$  mm. latis vel valde minoribus et piliformibus. Frons lanceolata 70 cm. longa 35 cm. lata apice acuta vel acuminata basi in ambitu rotundata tripinnatifida, pinnis inferioribus longissimis, infimis plus minus brevioribus, superioribus gradatim minoribus, pinnis longissimis pyramidal-lanceolatis 20 cm. longis 8 cm. latis obliquis (latere superiore latiore basi 6 cm. lato, latere inferiore minus lato 4 cm. lato) basi 10 cm. latis apice acuminatis (acuminibus pinnarum linearibus dentatis), pinnis infimis  $5\frac{1}{2}$  cm. longis 3 cm. latis apice obtuso-æntis pinnatis vel pinnatifidis pyramidalibus basi latis-simis petiolulatis (petiolulis 3 mm. longis), pinnulis ordinis primarii utroque latere pinnæ inferioris 6-7, infimis ovatis 18 mm. longis 10 mm.

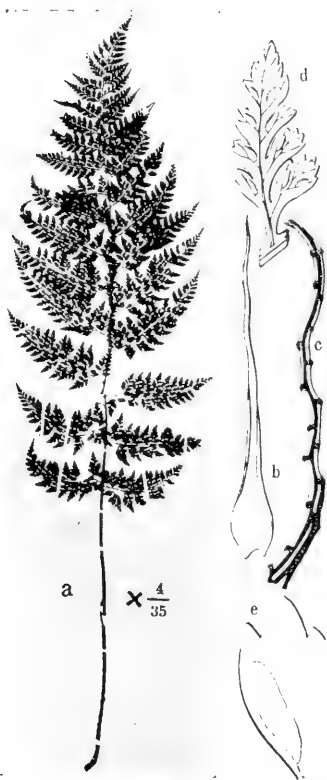


Fig. 161, *Asplenium viridissimum* HAYATA; a, the plant; b, a scale on the stipe; c, a hair-like scale on the stipe; d, a pinnule; e, apical portion of the same.

latis apice obtusis basi acuto-  
 cuneatis ad petiolulum 2 mm. longum  
 abeuntibus margine simpliciter  
 vel duplicato dentato-lobulatis,  
 lobulis acutis; textura herbacea,  
 pagina supra viridissima sub-  
 tus minus viridi. Sori sub lobulis pin-  
 nularum primariarum vel secundariarum  
 singuli oblongi  $2\frac{1}{2}$  mm. longi. Pin-  
 nae mediae et superiores a rhachibus  
 frondium angulo  $50^\circ$  divaricatæ; pin-  
 nae inferiores a rhachibus frondis angulo  
 $90^\circ$  divaricatæ. Rhachis frondis com-  
 planato-teres supra anguste subalata;  
 rhachis pinnae præsertim superi-  
 orum et pinnularum distincte alata,  
 cum alis  $1\frac{1}{2}$  mm. lata; costis mediis  
 rhachiarum tenuibus utroque distincte  
 elevatis, costulis pinnularum supra  
 distincte subtus obscure elevatis.

HAB. Arisan, leg. B. HAYATA et  
 S. SASAKI, Jan., 1912.

Near *Asplenium Mertensianum*  
 KZE., but differs from it by the much  
 broader fertile pinnules. Also near  
*Asp. affine* Sw., but distinguishable  
 from it in having much larger tri-  
 pinnate fronds of herbaceous texture.

***Asplenium Wrightii* EAT. var. *aristato-serrulatum* HAYATA n. v.** (Fig.  
 162). Rhizoma? Stipes 15 cm. longus  $2\frac{1}{2}$  mm. in diametro castaneo-nigres-  
 cens glaberrimus. Frons in ambitu ovato-lanceolata 50 cm. longa 25 cm. lata  
 apice caudato-acuminata basi in ambitu acuta pinnata, pinna terminali lineari  
 acuto-uncinato-dentata 7 cm. longa acuminata, pinnis lateralibus inferioribus

longissimis lanceolato-linearibus 14–15 cm. longis basi 13 mm. latis apice acuminato-linearibus basi latissimis subito cuneato-acutis ad petiolum 5 mm. longum abeuntibus margine duplicato-serratis, serris apice uncinato-recurvatis, pinnis mediis a se  $2\frac{1}{2}$ –3 cm. remotis, petiolis alatis. Textura herbacea, pagina viridissima, costis et venis utraque pagine elevatis, venis tenuissimis subfurcatis; rhachis supra sulcata nigro-castanea glabra inferiore non alata superiore alata cum alis  $2\frac{1}{2}$  mm. lata. Sori lineares a prope costas usque ad sinus serrarum extensi utroque latere costæ uniseriatim approximativè basi pinnarum usque ad apicem dispositi.

HAB. Urai, kg. B. HAYATA, Juli., 1912.

Differs from the type (MAKINO Phanerog. et Pterid. I. t. 5) by the more sharp uncinuate teeth curving downwards, more closely arranged sori, and by the much thicker texture. Also near *Asp. contiguum* KLF., but quite distinguishable by the sori reaching nearly to the margin.

*Athyrium* ROTH.

*Athyrium erythropodum*

HAYATA sp. nov. (Fig. 163). Rhizoma? Stipes 40 cm. longus gracilis 2 mm. in diametro basi parce squamatus haud nitidus leviter albo-purpurascens. Frons ovato-triangularis 30 cm. longa 23 cm. lata apice tenuissime cuspidato-acuminata basi latissima subtruncata bipinnata, pinnis inferioribus a se 4 cm. remotis angulo  $50^\circ$  a rhachibus egressis, pinnis mediis longissimis triangulari-lanceolatis 15 cm. longis 5 cm. latis apice lineari-acuminatis tenuissimis (acuminibus linearibus versus summum subsubulatis) basi petiolatis (petiolis 5 mm. longis), pinnulis infimis triangulari-oblongis 3 cm. longis basi 7 mm. latis



FIG. 162, *Asplenium Wrightii* EAT. var. *aristato-serrulatum* HAYATA; a, the plant; b, a pinna.



Fig. 163, *Athyrium erythropodum* HAYATA; a, the plant; b, a scale on the stipe; c, a pinule; d, a sorus of the *Athyrium*-type.

apice acutis basi late acutis vel rotundatis petiolulatis (petiolulis 3 mm. longis), pinnatifidis, segmentis infimis oblongis 8 mm. longis 3 mm. latis apice apiculato-acutis basi

cuneatis contractis. Textura herbacea. Sori utroque latere secus costulas segmentorum 1-seriatim dispositi semi-oblongi recurvati.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Athyrium macrocarpum* (Bl.).

***Athyrium reflexipinnum***

HAYATA sp. nov. (Fig. 164).

Rhizoma erectum longiusculum cum reliquis stipitem 1 cm. in diametro. Stipes caespitosus usque 5 cm. longus stramineus basi squamatus sursum glaber, squamis lineari-lanceolatis usque 7 mm. longis  $\frac{3}{8}$  mm. latis apice subulatis basi latissimis truncatis fuscentibus. Frons lanceolata vel ovato-lanceolata 11 cm. longa  $3\frac{1}{2}$  cm. lata apice acuminatissima (acumine lineari) basi in ambitu obtusa pinnata, pinnis patentibus superioribus a rhachibus  $50^{\circ}$ – $60^{\circ}$  egressis, mediis horizontali-

ter patentibus, inferioribus desuper reflexis, mediis longissimis, infimis brevioribus, superioribus brevioribus versus summum ad dentem acuminis reductis, mediis a se 1 cm. remotis triangulari-lanceolatis 2 cm. longis 12 mm. latis apice acutis basi truncatis sessilibus basi latere superiore latioribus

quam latere inferiore, pinnatifidis vel pinnatilobis, lobis infimis (latere superiore) ovatis 5 mm. longis 3 mm. latis apice in ambitu obtusis basi plus minus contractis margine ascendente-dentatis apice tri-dentatis, dentibus triangularibus acutis  $\frac{1}{2}$  mm. longis; rachis pinnarum basi supra lobos infimos 1 mm. lata, costis pinnarum supra  $\pm$  canaliculatis sub-

tus  $\pm$  elevatis; textura herbacea. Sori secus costas pinnarum vel secus costulas loborum pinnarum utroque latere 1-seriatim dispositi semi-oblongi plus minus recurvi vel semi-orbiculares. Indusium breve subcordatum vel recurvato-lunulare.

HAB. In monte Morrison, leg. S. SASAKI et T. KAWAKAMI, Oct., 1909.

**Athyrium tozanense** HAYATA n. n.



Fig. 164, *Athyrium reflexipinnum* HAYATA; a, the plant; b, a scale; c, a pinna; d, a sorus of the *Dryopteris*-type; e, another one of the *Athyrium*-type.

*Asplenium tozanense* HAYATA Mater. Fl. Formos. p. 440.

HAB. Arisan, leg. B. HAYATA et S. Sasaki, 1912, Jan.

*Blechnum* LINN.

***Blechnum integrispinnulum*** HAYATA sp. nov. (Fig. 165). Rhizoma erectum ascendens reliquis stipitum obiectum teres cum reliquis stipitum

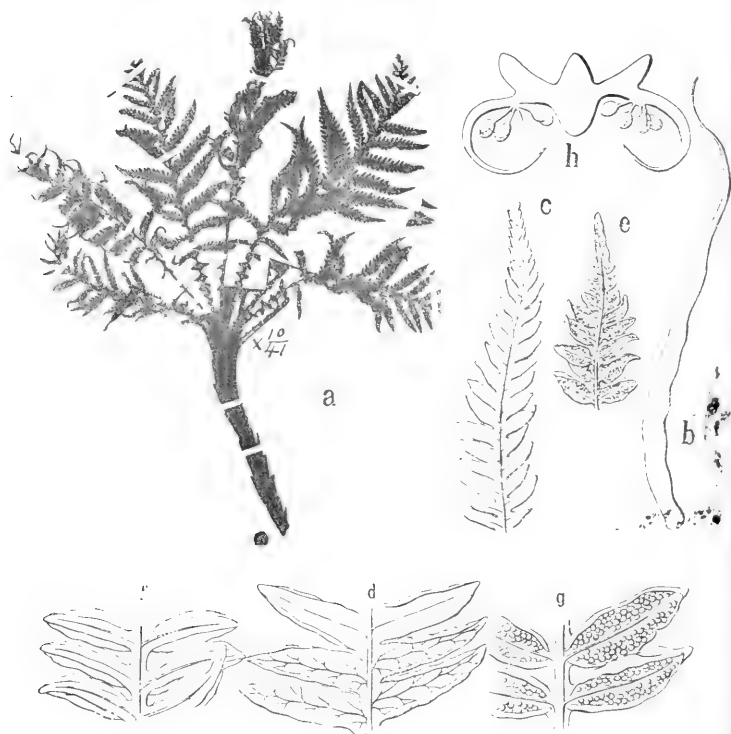


Fig. 165. *Blechnum integrispinnulum* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna of a sterile frond; d, a portion of the same; e, a pinna of a fertile frond; f, a portion of the same (upper surface); g, the same (under surface); h, cross section of a pinnule of a fertile frond. a =  $\times 1\frac{1}{2}$ ; c and e, natural size; others more or less magnified.



1½ cm. in diametro plus quam 15 cm. longum persimiliter supra terram erectum (supraterraneum) apice frondes steriles et fertilesque profuse emit-tens. Frons sterilis: stipes brevis 3-4 cm. longus squamis dense obtectus, squamis linearibus 1 cm. longis basi 1 mm. latis apice acuminatis filiformibus basi obscure peltatis margine integris; frons obovato-lanceolata 20-25 cm. longa 10 cm. lata recto-patens pinnata vel pinnatifida apice acuta vel acuminata basi subito attenuata ad stipitem brevem abeuns, pinnis mediis longissimis lineari-lanceolatis 6 cm. longis 12 mm. latis apice acuminatis basi ± contractis a se 1½ cm. remotis ad rhachin pinnatifidis, segmentis mediis oblique lineari-triangularibus 7 mm. longis 2½ mm. latis apice subito acutis vel obliquis margine integris; rhachibus pinnarum subalatis, alis irregulariter oblique inciso-fidis, segmentis alæ iis pinnarum æquantibus; pinnis infimis subito ad pinnam auriculiformem reductis, auriculis oppositis vel alternis gradatim minoribus a se 6-7 mm. remotis, superioribus angustato-quadrangularibus 7 mm. longis 3 mm. latis basi dilatatis apice obtusis a rhachibus frondium angulo recto divaricatis; pinnis superioribus angulo 50° divaricatis, inferioribus angulo recto egressis; textura subcoriacea pagina glabra, rhachibus costulisque utraque pagine elevatis toto glabris. Frons fertilis: fronde sterili subæquilonga ± angustiore lanceolata 6 cm. lata pinnata, pinnis a se 1 cm. remotis lanceolatis, mediis 3 cm. longis 7 mm. latis apice longe caudatis, caudis linearibus 1 cm. longis 2 mm. latis apice obtusis, basi ± petiolulatis, inferioribus gradatim minoribus, pinnatifidis, segmentis linearibus 6 mm. longis 1-2 mm. latis, subtus toto longitudine soriferis; rhachis frondis angustissime alata.

HAB. Taitō: leg. T. KAWAKAMI, 1910, Aprili. (No. 4902).

Quite near *B. Fraseri* LUERSS. and its variety *philippinense*; but distinctly differs from them by the smaller fronds with entire pinnules. The occurrence of this group of the genus in Formosa is very interesting. There are in all two species and a variety; one species exists in Newzealand, a variety of the same species in the Philippines and the other, the present one, in Formosa.

### *Coniogramme* FÉE.

***Coniogramme parvipinnula* HAYATA** sp. nov. (Fig. 166). Rhizoma? Stipes 40-50 cm. longus subglaber stramineus. Frons ovata vel ovato-triangularis 60 cm. longa 40 cm. lata apice triangulari-acuta basi in ambitu late obtusa

bipinnata, pinnis inferioribus longissimis superioribus minoribus sursum ad pinnas simplices lanceolatas reductis, pinnis inferioribus petiolatis (petiolis 3-4 cm. longis) a se 13 cm. remotis pinnatis utroque latere rhachis frondis 6-7; pinnis superioribus simplicibus (i.e. non pinnatis) utroque latere 8; pinnis inferioribus pinnatis lanceolatis 30 cm. longis basi latissimis basi 16 cm. latis apice cuspidato-acuminatis basi truncatis,

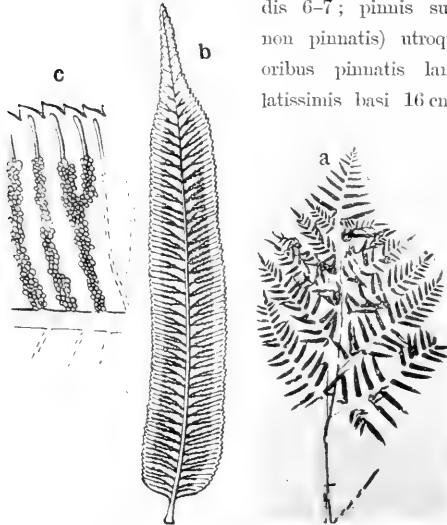


Fig. 166, *Contogramme parvipinnula* HAYATA; a, the plant; b, a pinnule; c, a portion of the same.

pinnulis utroque latere rhachis pinnæ 14, pinnula terminali lanceolata iis superioribus lateralibus majore, pinnulis infimis maximis lineari-lanceolatis 9 cm. longis 12 mm. latis apice lineari-recto-acuminatis basi truncatis margine minute regulariter denticulato-serrulatis, partibus basilaribus truncatis integris petiolulatis, petiolulis 1 cm. longis; pinnulis

superioribus vel pinnis superioribus minoribus lanceolatis sessilibus 27 mm. longis 6 mm. latis; pinnis a rhachibus frondium angulo 45°, pinnulis a rhachibus pinnarum angulo 80°-90° egressis; venis toto liberis furcatis, ramis ad prope apicem serrularum attingentibus, ramis ad apicem clavatis. Textura herbaceo-membranacea. Sori lineares a costa usque ad  $\frac{2}{3}$  secus venas extensi. Indusium nullum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

I have much hesitated to describe this fern as a species distinct from *C. fraxinea* FÉE. In general appearance, the former greatly differs from the latter in having bipinnate fronds with far much smaller pinnules. In close examination, however, the pinnæ and pinnules of our fern show many tran-

sitional forms from smaller to larger ones in one and the same specimen. Further study in the field and exhaustive comparison with rich materials will prove that this is a compound form of *C. frazinea* FÉE.

***Hypolepis* BERNH.**

***Hypolepis tenuifolia* BERNH.** COPELAND Polyp. Philipp., p. 95; DIELS Natür. Pfl.-fam. Pterid. p. 278, fig. 147-A.

HAB. Kōshūn, Mt. Hieranzan, leg. B. HAYATA et S. SASAKI, Juni., 1912.

***Plagiogyria* METT.**

***Plagiogyria adnata* BEDD.** Fern. Brit. Ind. t. 51.

HAB. Shinkō: Shibaraku, leg. U. MORI, Juli., 1906.

Compared with a Japanese specimen so labelled in the Tōkyō herbarium. Pinnæ of the fertile frond are more straight, (not crispate) longer and stronger, than those of the Japanese specimen. Perhaps a variety of the type.

***Plagiogyria euphlebica* METT.** HAYATA Mater. Fl. Formos. p. 443.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

***Plagiogyria falcata* COPEL.** in Philip. Journ. Sci. Bot. II.-2. p. 133, t. I.-B. *Plagiogyria Hayateana* MAKINO in Tōkyō Bot. Mag. XX. p. 245. *Plagiogyria Matsumuræ* HAYATA (non MAKINO) Fl. Mont. Formos. p. 244.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

***Plagiogyria stenoptera* DIELS.**

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Compared with a specimen so labelled in the herbarium at Tōkyō.

***Pteris* LINN.**

***Pteris dactylina* HOOK.** Sp. Fil. II. p. 160 t. 130-A; HOOKER et BAKER Syn. Fil. p. 155; BEDD. Handb. Fer. Brit. Ind. p. 108 fig. no 56 et Fern. Brit. Ind. t. 23.

HAB. Taitō: Chakankei, leg. U. MORI.

DISTRIB. Nepal to Sikkim and Khasya, ascending to 9000 ft.

***Pteris excelsissima* HAYATA** sp. nov. (Fig. 167). Rhizoma? Stipes 150 cm. longus glaberrimus basi castaneo-ferrugineus superiore intus stramineus intus profunde sulcatus validissimus basi 2 cm. in diametro sectionis. Frons



Fig. 167, *Pteris excelsissima* HAYATA: a, the plant; b, a young specimen; c, a pinnule of the plant; d, a portion of the same.

in ambitu late ovata 130 cm. longa 90-100 cm. lata apice in ambitu late triangulari-acuta bi-tripinnatifida glaberrima subcoriacea vel membranaceo-coriacea, pinnis utroque latere 9 mediis a se 12 cm. remotis lineari-lanceolatis pinnatifidis, pinnis infimis a rhachibus frondium angulo 50° divaricatis longissimis (interdum 2-partitis 60 cm. longis 18 cm. latis lanceolatis subsessilibus ad rhachin pinnatifidis, segmento terminali longissimo lineari 14 cm. longo 1 cm. lato apice longe acuminato basi æquilato margine integro, segmentis juxta terminalem et infimis brevissimis 3 cm. longis 1 cm. latis triangulari-acutis, pinulis mediis longioribus 10 cm. longis 1 cm.

latis apice acuminatis basi decurrento-dilatatis 22 mm. latis cum iis proximatis continuis (sinibus inter segmenta obtusis 13 mm. latis) margine integris; pinna terminali 20 cm. longa cuspidato-ovata 10 cm. lata ad rhachin pinnatifida,

segmento terminali longe lineari 10 cm. longo; pinnis juxta terminalem 16 cm. longis; textura membranaceo-subcoriacea; pagina margine sorifera integra, sed prope apicem non sorifera minute crenata. Rhachis pinnarum supra profunde sulcata utroque latere sulcorum 1-lamellata et remote setulosa, setulis 2 mm. longis latere complanatis a se 1-1½ cm. remotis; costa vel costula segmenti supra impressa glabra subtus elevata, venis lateralibus liberis plerumque duplicato-furcatis (venis a basi furcatis, ramis venarum furcatis). Sori marginales a prope basin segmentorum usque ad supra medium extensi, ab apice segmentorum 1 cm. distantes.

HAB. Arisan, fere 7-6000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Very near *Pteris excelsa* GAUD. (HOOK. Sp. Fil. II. p. 183 t. 136; BEDD. Fern. Brit. Ind. t. 218; and Herb. Corean. tested by Dr. T. NAKAI); but ours is different from that in having pinnules or segments with broader base and very much more acuminate linear apex. It should be better regarded as a variety of the same species and should be named *P. excelsa* var. *excelsissima*.

### ***Pteris pellucida* Pr.**

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

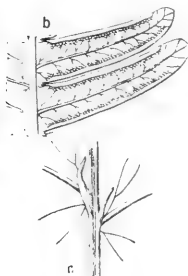
Formosan specimen is considerably different from the named species by the much narrower pinnae of the fertile and sterile fronds, as far as I can draw from the descriptions given in HOOK. BAK. Sy. Fil. and HOOK. Sp. Fil. In the Philippine specimens, there is a fern labelled *P. pellucida* which is exactly identical with our fern. I conject that this *Pteris* may vary a very wide range. At present, I am merely following the Philippine plant to take this name for our fern. The description in HOOK. et BAKER Syn. Fil. p. 154. shows that the fern has often lower pinnae 8 in long 1 in. broad. The figure given in HOOKER Sp. Fil. II. t. 126-B shows also a form with broader fronds than those of ours.

***Pteris setuloso-costulata* HAYATA sp. nov.** (Fig. 168). Rhizoma? Stipes 30-40 cm. longus 3 mm. latus stramineus glaber. Frons oblongo-lanceolata 60 cm. longa 30 cm. lata apice triangulari-acuta pinnata vel bipinnata in partibus infimis, pinnis suboppositis inferioribus a se 4-8 cm. remotis a rhachibus angulo 60° egressis, pinnis infimis magnis 18 cm. longis semitriangularibus basi 14 cm.

latis latere inferiore pinnulis 3-4 gerentibus latere superiore haud pinnuliferis subsessilibus vel breve petiolatis, pinnulis infimis a rhachibus pinnarum angulo  $70^{\circ}$ - $90^{\circ}$  divaricatis sessilibus late linearibus 13 cm. longis  $2\frac{1}{2}$  cm. latis



basi truncatis ad apicem subito acutis ad acumina abeuntibus (acuminibus linearibus 2 cm. longis 3 mm. latis margine crenulatis ad summum acutis) ad rhachin pinnatifidis, segmentis alternis linearibus a rhachibus pinnularum angulo  $80^{\circ}$  divaricatis 15 mm. longis  $3\frac{1}{2}$  mm. latis apice rotundato-obtusis basi plus minus dilatatis 5



mm. latis ad basin se continuis approximatis margine integris nervo-marginatis. Textura chartacea supra glabra, costulis utraque pagine elevatis venis venisque liberis a basi vel a medio furcatis, venulis ad marginem attingentibus supra subglabris subtus parvissime minuteque sub lente glanduloso-pilosis; costulis pinnarum utraque elevatis supra profunde sulcatis, utroque latere sulcorum anguste lamellatis,

lamellis remote minute setulosis. setulis acutis complanatis, segmentis margine toto latere (excepto basi apiceque) soriferis.

HAB. Mt. Morrison, ad 6000 ped. alt., leg. U. MORI, 1909, (No. 1867); Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Pteris biaurita* LINN. (HOOKER et GREV. Ic. Fil. t. 142), but differs from it by the lowest pinnae, which are not bipartite, but have 2-3-pinnules on the lower side. This is still nearer *Pteris quadriaurita* var. *setigera* (HOOK.) (BEDD. Fern. Brit. Ind. t. 202), which has setulose rachis like that of the present fern.

### ***Pteris tripartita* Sw.**

HAB. Taitō: Nanrio, leg. G. NAKAHARA, Jan., 1906, (No. 703).

Compared with a specimen from the Philippines.

*Vittaria* Sm.

*Vittaria arisanensis* HAYATA sp. nov. (Fig. 169).

Epiphytica. Rhizoma tenue dense squamatum, squamis tenuibus linearibus 10 mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis. Stipes subnullus. Frons linearis 50–60 cm. longa 8–9 mm. lata apice acuminata attenuata ad stipitem subnullum abeuns integra utraque glabra non squamata chartacea, costis supra non visis subtus fere distinctis sed non elevatis, margine subplana leviter recurvata vel non recurvata; venis lateralibus liberis laxissime dispositi. Sori a margine 1–1 $\frac{1}{2}$  mm. distantes.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan. Differs from *V. lineata* by the much larger fronds and by the sori which are not wrapped by the margin.

*Vittaria* sp.

A very slender fern resembling *V. lineata* (LOWE Ex. Fern. Vol. II. t. 65-A; EAT. Fern. North Americ. t. 38). No fructification.

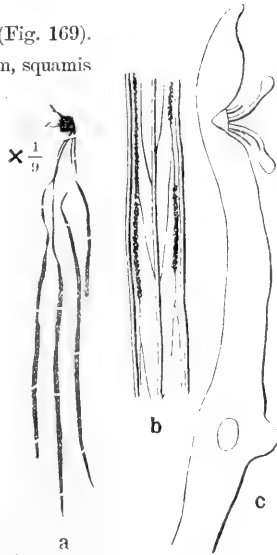


Fig. 169, *Vittaria arisanensis* HAYATA; a, the plant; b, a portion of the frond (underside); c, a portion of cross section of the frond.

*Polypodium* LINN.

*Polypodium arisanense* HAYATA sp. nov. (Fig. 170). Epiphytica.

Rhizoma repens complanato-teres 4 mm. in diametro sectionis ad insertionem stipitum valde elevatum (partibus elevatis 2 mm. longis) squamis dense obtectum, squamis cuspidato-triangularibus apice lineari-cuspidatis basi subtus latis-simis 1 $\frac{1}{2}$  mm. latis 3 mm. longis basi alte cordatis vel auriculato-cordatis, (auriculis cordum  $\frac{1}{2}$  mm. longis subimbricatis basi 2-lobatis, lobis triangularibus margine remote denticulatis), supra insertionem pilis longiusculis 1 mm. longis 5–6 instructis castaneis. Stipes intus sulcatus stramineus extus rotundatus castaneus semiteres 2 mm. in diametro 10 cm. longus gracillimus glaber haud

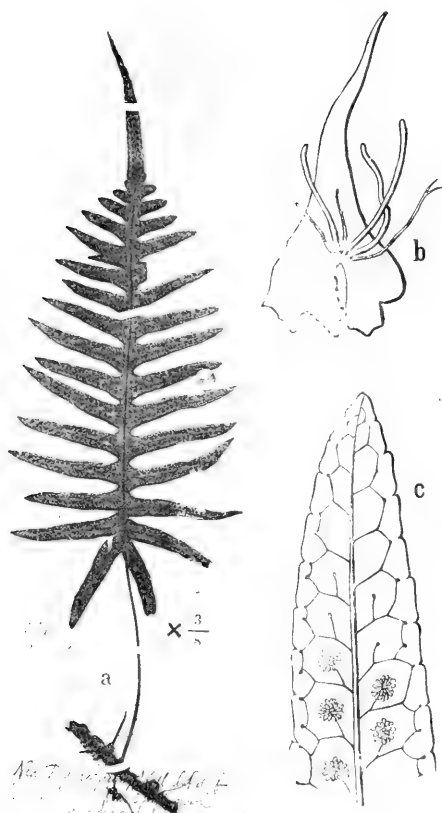


FIG. 170, *Polypodium arisanense* HAYATA; b, a scale on the rhizome; c, a portion of a pinna.

vel rotundatis a rhachibus frondium  $80^\circ$  egressis, segmentis inferioribus gradatim longioribus, segmentis infra medium longissimis a rhachibus frondium circ.  $90^\circ$  egressis 55 mm. longis 10 mm. latis linearibus apice acuminatis ad summum obtusis basi latissimis dilatatis, sinibus inter segmentorum obtusis apice a costa rhachis frondis 3 mm. distantibus, segmentis infimis desuper

squamatus. Frons caudato-ovato-lanceolata pinnatifida 26 cm. longa 10 cm. lata apice longe caudata, pinna vel segmento terminali longissimo lineari 8 cm. longo 8 mm. lato apice lineari-acuminato ad summum obtuso basi haud contracto tenuiter serrulato, serrulis obtusis ascendentibus brevissimis approximatis 2 mm. a se distantibus latere inferiore 2 mm. longis costa cum costa parallelis latere superiore  $\frac{1}{3}$ - $\frac{1}{4}$  mm. longis, areolis costalibus subrectangularibus 3 mm. longis totiusque latis venulas liberas singulas includentibus, venulis liberis soro terminatis; segmentis vel pinnis lateralibus juxta pinnam terminalem brevissimis triangulari-oblongis circ. 8 mm. longis 5 mm. latis apice obtusis



reflexis brevioribus  $4\frac{1}{2}$  cm. longis; costis segmentorum supra plano-elevatis, subtus acuto-elevatis; areolis costalibus secus rhachin frondis linearibus mediis  $1\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  mm. latis; costis venis venulisque utraque pagine distincte nigro-coloratis; pagina supra glabra subtus ad costas venasque sub lente minute parcissime squamata vel demum glabrata. Textura membranacea. Sori dorso ad paginam superiorem elevati, partibus elevatis rotundatis medio umbonato-impressis.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Polypodium formosanum* BAKER, but differs from it by the more acuminate pinnae which are more or less ascending, but not quite horizontally arranged like those of *P. formosanum*. Also near *P. amœnum* WALL. = *Goniophlebium amœnum* J. SM. (BEDD. Fern. Brit. Ind. t. 5), but distinguishable from it by the quite naked fronds with much longer linear terminal lobes.

**Polypodium decrescens** CHRIST (Fig. 171) var. **blechnifrons** n. v.  
Rhizoma repens teres tenue minus 1 mm. crassum dense squamatum dense radicans dense foliosum, squamis fusco-castaneis tenuissimis lanceolatis 4 mm. longis  $\frac{3}{4}$  mm. latis apice acuminatis basi rotundatis subcordatis non peltatis. Stipes brevis usque 1 cm. longus semiteres supra (intus) planus densiuscule pilis horizontaliter patentibus obtectus, pilis 1-seriatim pluricellularibus castaneo-rubrescentibus  $1\frac{1}{2}$  mm. longis apice clavatis, præterea pilis brevissimis 2-cellularibus apice clavatis latioribus parce dispersus. Frons lanceolata vel oblongo-lanceolata 13 cm. longa 3 cm. lata apice acuta vel caudato-acuminata (caudis linearibus  $2\frac{1}{2}$  cm. longis  $2\frac{1}{2}$  mm. latis ad summum obtusis) vel ecaudata simpliciter acuta basi subito cuneata attenuata lineari-attenuata ad stipitem 1 cm. longum abeuns, (partibus attenuatis  $4\frac{1}{2}$  cm. longis sursum 1 cm. latis deorsum  $1\frac{1}{2}$ -1 mm. latis margine undulato-repandis, undulis gradatim minoribus demum ad nullum abeuntibus, undulis superioribus triangularibus 4 mm. latis 2 mm. longis apice obtuso-rotundatis), partibus principalibus (partibus frondis exceptis partibus attenuatis et caudis) toto circ. ad rhachin pinnatifidis, segmentis linearibus rectis circ. angulo  $50^{\circ}$ - $60^{\circ}$  a rhachibus frondis egressis versus apicem angustioribus ad summum obtusis deorsum latioribus ad basin plus minus dilatatis, mediis 13 mm. longis basi 3-4 mm. latis a se (a



Fig. 171, *Polypodium decrescens* CHRIST var. *blechnifrons* HAYATA; a, the plant; b, a scale on the rhizome; c, a glandular hair on the stipe; d, hairs on the stipe; e, apex of one of the same hairs; f, basal portion of the same; g, a portion of the frond.

marginē ad marginem) 3 mm. remotis marginē integerrimis plus minus desuper recurvis, sinibus inter segmentos linearibus apice obtuso-rotundatis. Textura crassiuscula tenuiter coriacea, pagina subtus subplana parcissime pilis brevissimis glanduliferis dispersa supra subglabra secus sulcis costarum remotissime paucissime barbis dispersa; rhachibus frondium supra sulcato-impressis, costulis segmentorum supra non visis tenuiter impressis.

Sori utroque latere costæ 1-seriatim suboppositim dispositi, a se 2-3 mm. remoti oblongo-rotundati  $1\frac{1}{2}$  mm. longi.

HAB. Arisan, inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near the type which is known to exist in Celebes and the Philippines. I have not seen either the authentic specimen or original description. So far as is concerned a specimen from the Philippines labelled "*Polypodium decreescens* CHRIST, teste CHRIST, Bagnen, Lepanto, Luzon, 6500 ft. Nov. 1905, No. 1916," and figures given in the Philip. Journ. Sc. I. Supp. II. t. 17, the present fern is slightly different from the type in having broader fronds and longer stipes. This new variety is somewhat near *P. obliquatum* DRUDE, but quite distinguishable from it in having linear obtuse pinnæ arranged in a much acuter angle and by the elevated (not immersed) rounded sori. It is also near *Polypodium Thwaitesii* BEDD. (Handb. Fern. Brit. Ind. p. 310, fig. 164 and Fern. Brit. Ind. t. 188.),

*P. repandulum*

METT. (BEDD.

Handb. Fern. Brit.

Ind. p. 313, fig.

167) and *P. sub-*

*falcatum* BL.

(BEDD. Fern. Brit.

Ind. tt. 76 et 189),

but differs from all

of them and especi-

ally from the last

one by the entire

pinnæ or lobes of

the fronds.

***Polypodium***

***falcatopinna-***

***tum* HAYATA sp.**

nov. (Fig. 172).

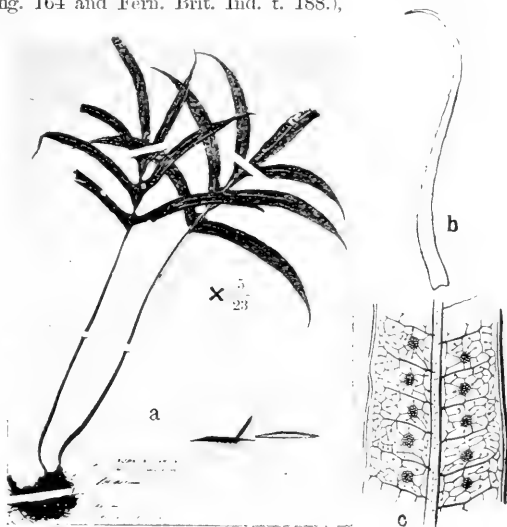


Fig. 172, *Polypodium falcatopinnatum* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond.

Rhizoma repens teres 4-5 mm. in diametro squamis dense obtectum, squamis valde adpressis ovato-cuspidatis 2-3 mm. longis. Stipes 20-25 cm. longus glaberrimus esquamatus intus (supra) profunde sulcatus stramineus. Frons late triangularis stipitem in longitudine subæquans vel eo brevior 20 cm. longa 25 cm. lata pinnatifida, pinna terminali lineari 15 cm. longa apice longe acuminatissima 15 mm. lata margine plana undulato-crenata vel subintegra, pinnis lateralibus pinna terminali conformibus æquilongis falcato-recurvis apice acuminatis (acuminibus linearibus desuper falcatis) utroque latere rhachis frondis 3-4 suboppositis basi longe decurrentibus fere ad rhachin attingentibus 2 cm. a se remotis, sinibus inter pinnas latis rotundatis, costis et costulis supra subelevatis distincte sulcatis, pinnis a costa angulo 60° divaricatis patentibus, venis lateralibus utraque pagine elevatis tenuibus a costula angulo 70° divaricatis. Sori utroque latere costæ pinne uniseriatim dispositi inter venas solitarii.

HAB. Kōtōshō: leg. T. KAWAKAMI et S. SASAKI, Juli., 1912, (No. 5).

Near *P. palmatum* BLUME, but differs from it by the pinne curving downwards.

***Polypodium gracillimum* COPEL.**

*Polypodium cucullatum* HAYATA Mater. Fl. Formos. p. 445 (Non NEES).

Compared with a specimen from the Philippines labelled "*P. gracillimum* COPEL. Mt. Apo, Mindaneo, alt. 6000 ft. Oct. 1904, No. 1526."

***Polypodium lineare* THUNB. var. *monilisorum* HAYATA n. v. (Fig. 173).** Rhizoma repens gracile 1-1½ mm. crassum, squamis dense obtectum, squamis rubro-castaneis ovato-lanceolatis 2½ mm. longis ⅔ mm. latis apice acuminatis basi latissimis ovatis peltatis basi rotundatis vel plus minus angulatis a basi usque ad insertionem ⅓ mm. longis margine remote obscure denticulatis vel subintegris medio rubro-maculatis, maculis ovato-lanceolatis. Stipes circ. 1 cm. longus glaber. Frons linearis curva 15 cm. longa 3-4 mm. lata apice lineari-acuminata basi gradatim attenuata ad stipitem brevem abeuns in exsiccatō inter soros plus minus moniliforme constricta supra glabra subtus secus costas squamis remote paræque dispersa vel glabrata supra in exsiccatō pallido-viridis subtus pallidissima plus minus flavesceus, costis utraque pagine elevatis. Textura tenuiter coriacea. Sori infra acumen 2 cm. longum 2 mm.

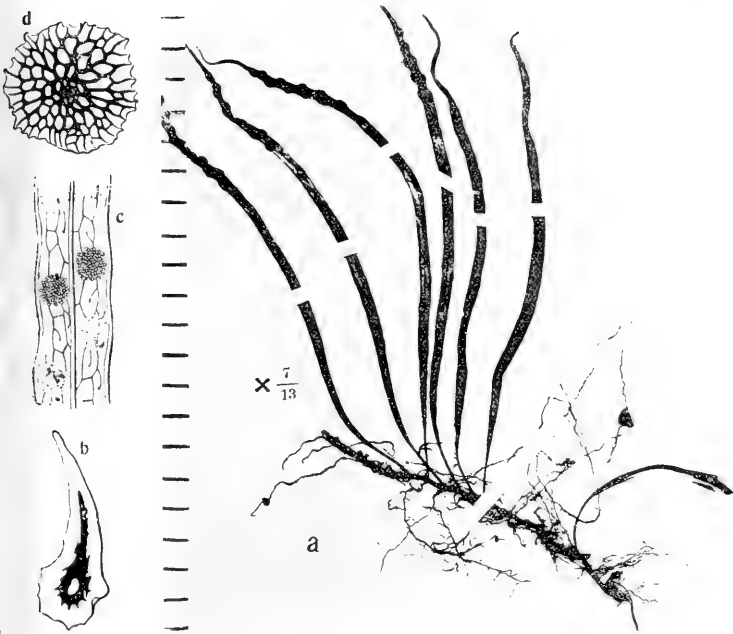


Fig. 173. *Polypodium lineare* THUNB. var. *monilisorum* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, a paraphysis.

latum frondis deorsum usque ad 3-4 cm. dispositi utroque latere costæ 1-seriatim dispositi suboppositi elliptico-rotundati  $3\frac{1}{2}$  mm. longi  $2\frac{1}{2}$  mm. lati longiores quam latiores inferiores a se 4 mm. remotis; paraphysis paucissimis peltatis rotundatis margine denticulatis.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Differs from the type by the roundly peltate paraphysis of the sori, much narrower and less coriaceous frond and especially by the soriferous parts of the fronds which are moniliformly contracted when dried.

**Polypodium Meyenianum** (SCHOTT), HOOK.; MATSUM. et HAYATA Enum. Pl. Formos. p. 634.

HAB. Hieranzan, prope Kusukusu, leg. B. HAYATA et S. SASAKI, Juni., 1912.

**Polypodium morrisonense** HAYATA Mater. Fl. Formos. p. 447.

Near *Pleopeltis hemionitidea* MOORE. = *Polypodium hemionitideum* WALL., but differs from it by the thin membranaceous texture.

**Polypodium pellucidifolium** HAYATA sp. nov. (Fig. 174). Rhizoma repens teres squamis patentibus dense obtectum 3-4 mm. in diametro, squamis

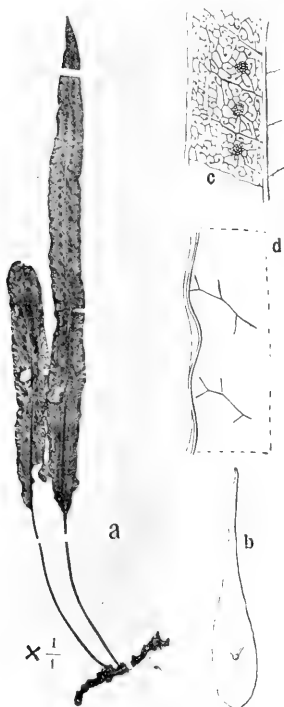


Fig. 174, *Polypodium pellucidifolium* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, margin of the same.

ovato-lanceolatis peltatis apice cuspidatis basi rotundatis castaneis. Stipes 10-9 cm. longus glaber intus (supra) profunde sulcatus. Frons linearis 35 cm. longa 22 mm. lata apice acuta basi acuta vel cuneato-acuta margine integra vel crispato-undulata plus minus tenuiter desuper recurva vel plana supra nitida, costa supra profunde sulcata subtus prominente elevata, venis lateralibus subrectis a costa angulo  $65^\circ$  egressis supra nigro-coloratis leviter flexuosis valde distinctis subtus tenuiter elevatis prope marginem evanescentibus, reticulis venularum supra visis; textura tenuiter coriacea pellucida. Sori uniseriatim a infra medium usque ad apicem frondis dispositi, inter venas laterales solitarii.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *P. Engleri*, but differs from it by the shining semi-transparent larger fronds with distinct veins.

**Polypodium obtusifrons** HAYATA n. sp. (Fig. 175). Rhizoma repens teres 2 mm. crassum squamis dense obtectum, squamis castaneis cuspidato-rotundatis 2 mm. longis 1 mm. latis apice obtuse lateque cuspidatis basi dilatatis rotundatis profunde cordatis,

lobis cordis valde imbricatis  $\frac{1}{2}$  mm. longis, margine sursum irregulariter obscure-que denticulatis vel subintegris deorsum lasiniato-lobulatis, lobulis linearibus recurvis, vel peltatis elobatis. Stipes brevissimus 1 cm. longus complanatus supra planus subnullus glaber. Frons spathulata vel lineari-spathulata 4 cm. longa usque 9 mm. lata sursum infra apicem 6 mm. lata apice obtusissime vel rotundata valde crassa margine integerrima tenuiora anguste subcartilaginea, costa utraque pagine a basi usque ad medium tenuiter obscure visa a medio ad apicem non visa haud elevata; frons medio usque ad prope apicem sorifera. Sori a medio usque ad prope apicem frondis utroque latere costæ 1-seriatim dispositi perfecte rotundati  $2\frac{1}{2}$  mm. in diametro supra ad paginam plani, paraphysis numerosis peltatis angulato-rotundatis vel margine sublobatis.

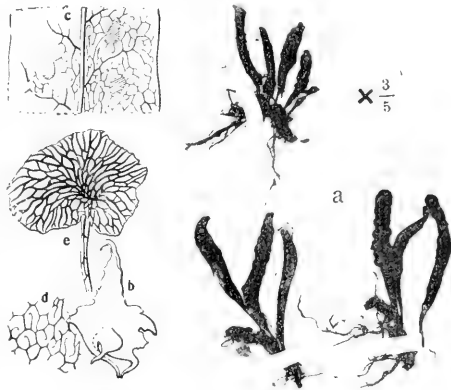


Fig. 175, *Polypodium obtusifrons* HAYATA; a, the fronds; b, a scale on the rhizome; c, a portion of the frond; d, reticulation of the veinlets; e, a paraphysis.

HAB. Kwannonzan, leg. T. SÔMA, 1910, Oct.

Near *P. lineare* TH. but differs from it by the very much shorter obtuse fronds with quite different venation. Still nearer to *Polypodium Onzei* Fr. et SAV. (MAKINO Phanerog. et Pterid. I. t. 10), but differs from it by the much complicated reticulation of the fronds which have more obtuse rounded apex.

***Polypodium pseudotrichomanoides* HAYATA sp. nov.** (Fig. 176). Rhizoma ascendentum erectum circ. 1 mm. crassum densissime radicans (radicibus fibrosis numerosis) densissime squamatum, squamis castaneo-fuscentibus tenuissimis sub luce traverso flavis ovato-lanceolatis usque  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice acuto-obtusis vel obtusis basi rotundatis. Stipes

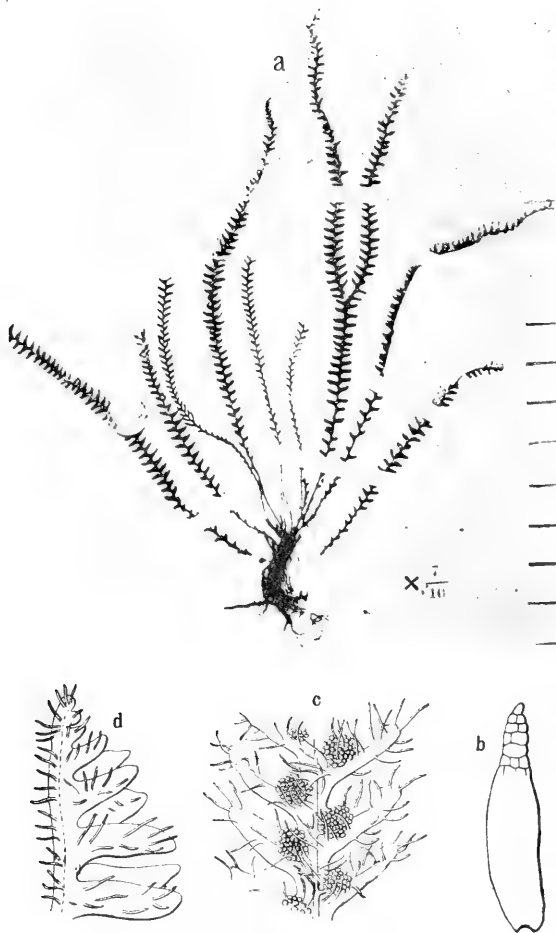


Fig. 176. *Polypodium pseudotrichomanoides* HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, apical portion of the frond.

versus apicem  
rhizomatis dense  
caespitosus bre-  
vissimus 1 mm.  
longus basi ad  
extremitatem  
2-3 squamatus  
semiteres. Frons  
linearis simplex  
vel a medio sur-  
sum furcata  
usque 13 cm.  
longa usque 6  
mm. lata apice  
gradatim an-  
gusta ad sum-  
mum obtusa vel  
a globulo termi-  
nata basilongea-  
tenuata angust-  
ata ad stipitem  
brevem abeums  
pinnatifida; rha-  
chis medio 1 mm.  
lata; segmentis  
mediis triangula-  
ri-linearibus la-  
tere superiore  $2\frac{1}{2}$   
mm. longis latere  
inferiore toti-  
usque longis  
apice obtusis basi  
 $\pm$  dilatatis 1 mm.



latis prope basin sorum singulum gerentibus margine integris circ. angulo  $90^\circ$  vel  $85^\circ$  a rhachibus egressis a se  $1\frac{1}{2}$  mm. remotis, segmentis superioribus gradatim minoribus se approximatis, segmento terminali subnullo vel ad globulum minutum reducto, segmentis inferioribus gradatim minoribus se plus remotis prope basin frondis ad dentem triangularem  $\frac{1}{2}$  mm. longum obtusum reductis a se 2 mm. vel plus remotis ad extremitatem frondis ad alam angustissimam reductis, segmentis in sectione plano-convexis  $\approx$ -formibus supra convexis subtus planis; pagina suberassiuscula utraque præsertim ad costam parce strigoso-pilosa, pilis validis castaneo-nigris usque 1 mm. longis, supra ad costam anguste sulcata subtus plana, venis non elevatis simplicibus haud ramosis, costis subtus non sulcatis.

HAB. ARISAN, leg. S. KUSANO; ibidem, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Polypodium trichomanoides* Sw., but differs from it in having simple veins and entire scales; from *P. Okuboi* YATABE and *P. setosum* METT. in having much narrower pinnae.

***Polypodium quasipinnatum*** HAYATA Mater. Fl. Formos. p. 447.

Near *Pleopeltis Moulmeinensis* BEDD. Fern. Brit. Ind. t. 205, but differs from it by the sori arranged in two or three rows on each side of the costæ. Also very near *P. malacodon* HOOK.

***Polypodium rostratum*** HOOK. (Fig. 177). HOOK. 1-st Cent. Fern. t. 53; BEDD. Fern. Brit. Ind. t. 159 et Handb. Fern. Brit. Ind. p. 347 fig. 193 cum nomine *Pleopeltis rostrata* HOOK.

HAB. IN MONTE MORRISON, ad 7000 ped. alt., leg. U. MORI, 1906, Dec. (No. 1896). Our fern closely resembles *P. rostratum* in the size, shape and texture of the fronds, but is a little different from it in the venation, as far as is concerned the figures in BEDD. Fern. Brit. Ind. t. 159, and HOOK. Ic. Pl. t. 953.

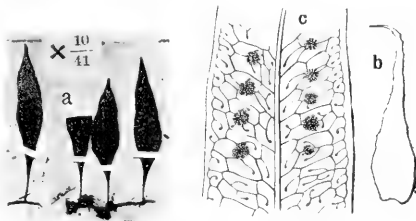


Fig. 177, *Polypodium rostratum* HOOK.; a, the plant; b, a scale; c, a portion of the frond.

The venation of our fern is more finely reticulated than that figured in HOOK'S work, but more loosely reticulated than that figured in BEDDOME'S.

**Polypodium tenuissimum** HAYATA sp. nov. (Fig. 178). Rhizoma breve tenue erectum apice dense squamatum apice stipites cæspitosum gerens, squamis tenuissimis fuscis oblongo-lanceolatis usque  $1\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice obtusis bisetosis basi  $\pm$  rotundatis vel leviter cordatis. Stipes brevissimus 1-2 cm. longus ad apicem rhizomatis cæspitosus ad basin

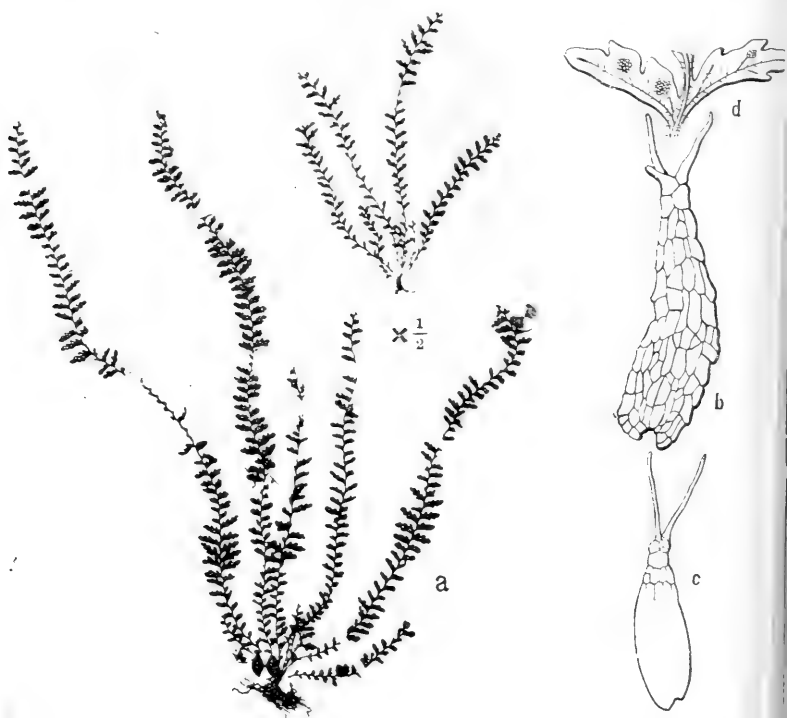


Fig. 178, *Polypodium tenuissimum* HAYATA; a, the plant; b, a scale on the rhizome; c, another smaller one; d, a portion of the frond.

squamatus supra basin sursum barbatus, barbis horizontaliter patentibus mollis 1-1½ mm. longis tenuissimis fuscentibus. Frons tenuissima utraque pagine præsertim ad costas venasque barbis mollis dispersa herbacea scandens usque 20 cm. longa 13 mm. lata apice acuminata ad summum obtusa basi gradatim attenuata circ. ad rhachin pinnatifida, segmentis mediis circ. 6 mm. longis 1-2 mm. latis sublineari-oblongis a rhachibus frondis 80°-70° egressis a se 3 mm. remotis apice obtusis basi latere inferiore decurrentibus margine latere superiore plus lobulatis quam latere inferiore, lobis 1 mm. longis obtusis; segmentis prope apicem subito vel gradatim minoribus ad lobos 2 mm. longos abeuntibus, segmento terminali 2 mm. longo obtuso, segmentis inferioribus gradatim minoribus, infimis ad dentem triangularem 1 mm. longum reductis; rhachis medio ½ mm. lata, costis utraque pagine elevatis, venis utraque pagine non visis parce ramosis. Sori sub basi lobulorum segmentorum singulariter siti rotundati ⅔ mm. in diametro.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *P. solidum* METT., but differs from it by the thinner herbaceous texture, bluntly lobed pinnae, and hirsute fronds and venis; also near *P. cucullatum* and *P. trichomanoides*, but separable from them by the dentately lobed pinnae; still nearer *Polypodium glandulosum* (HOOK. Sp. Fil. IV. p. 193, t. 276), from which our plant is distinguishable in having much narrower and much remoter pinnae of very much thinner texture, and by the absence of glandular hairs.

### *Cyclophorus* DESV.

***Cyclophorus grandissimus*** HAYATA sp. nov. (Fig. 179). *Niphobolus grandissimus* HAYATA Herb. Taihoku. Epiphytica. Rhizoma repens subteres 8 mm. in diametro squamis dense obtectum, squamis lanceolato-linearibus usque 7 mm. longis basi usque 1½ mm. latis stramineo-castaneis. Stipes 40 cm. longus glaber complanato-teres vel tetragonus supra planus latere sulcatus castaneo-stramineus. Frons 40 cm. longa 8 cm. lata lanceolata apice acuminata supra medium usque ad basin æquilata sursum abrupte acuminata basi leviter auriculato-dilatata basi fere truncata margine subintegra vel obscure repanda facie plana ad basin undulata pagine supra glabra subtus dense stellato-tomentosa, costis supra planis subtus elevatis, venis lateralibus tenuis-

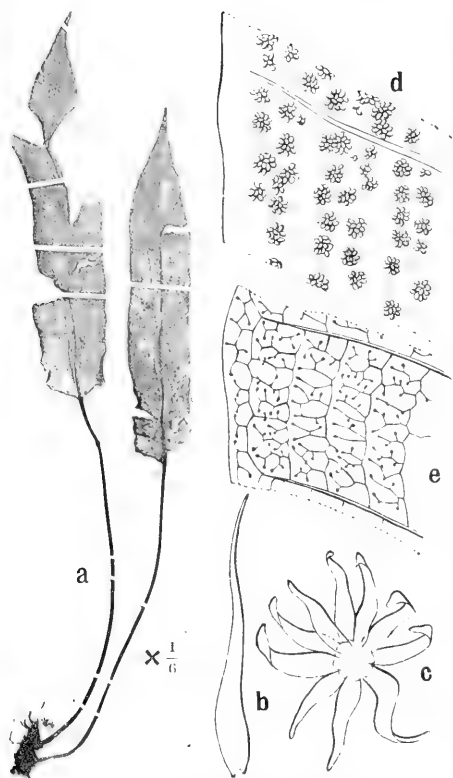


Fig. 179, *Cyclophorus grandissimus* HAYATA; a, the plant; b, a scale on the rhizome; c, a stellate hair on the frond; d, a portion of the frond, showing sori; e, the same, showing venation.

simis utraque pagine distincte visis a cota 50° divaricatis rectis mediis a se 8 mm. remotis; pagina supra atro-viridissima subtus dense ferrugineo-albescenti dense sorifera sed ad venas laterales non sorifera.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near *Niphobolus lingua* and *N. costata* (WALL.) BEDD. Fern. Brit. Ind. t. 120, but differs from them by the very much longer stipes and larger fronds with undulate margin and abruptly truncate somewhat auriculate base.

***Cyclophorus transmorrisonensis* HAYATA** sp. nov. (Fig. 180). Rhizoma breve suberectum? apice squamis dense obtectum, squamis lanceolatis  $2\frac{1}{2}$  mm. latis acuminatis. basi latioribus

cordatis margine ciliato-fimbriatis. Stipes 1 cm. longus non squamatus obscure subalatus dense pilosus, pilis stellatis. Frons lanceolata 3-5 cm. longa crassiuscula primum utraque pagine densissime stellato-pilosa demum supra dense vel parce pilosa subtus semper densissime pilosa supra parce

depresso-punctata apice attenuato-obtusa vel obtusa basi gradatim attenuata margine integra exsiccato vel humido superne recurvo-revoluta subtus dense sorifera; costa utraque pagine non visa. Sori rotundati minus 1 mm. in diametro irregulariter dense approximativim dispositi.

HAB. Montibus centralibus, ad 10000 ped. alt., leg. U. MORI, 1906, (No. 2363).

*Niphobolus transmorrisonensis* HAYATA in sched. herb. Taihoku.

*Niphobolus fissus* HAYATA Mater. Fl. Formos. p. 448 (non BLUME). Near *N. fissus* BLUME, but differs from it by the fronds which are pilose on both sides.

***Elaphoglossum* SCHOTT.**

***Elaphoglossum conforme* MOORE;** BEDD. Fern. South Ind. t. 198 et Handb. Fern. Brit. Ind. p. 416 fig. 247.

HAB. Arisan, 6000-7000 ped. alt., B. HAYATA et S. SASAKI, Jan., 1912.

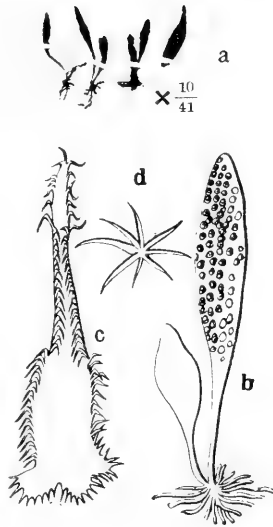
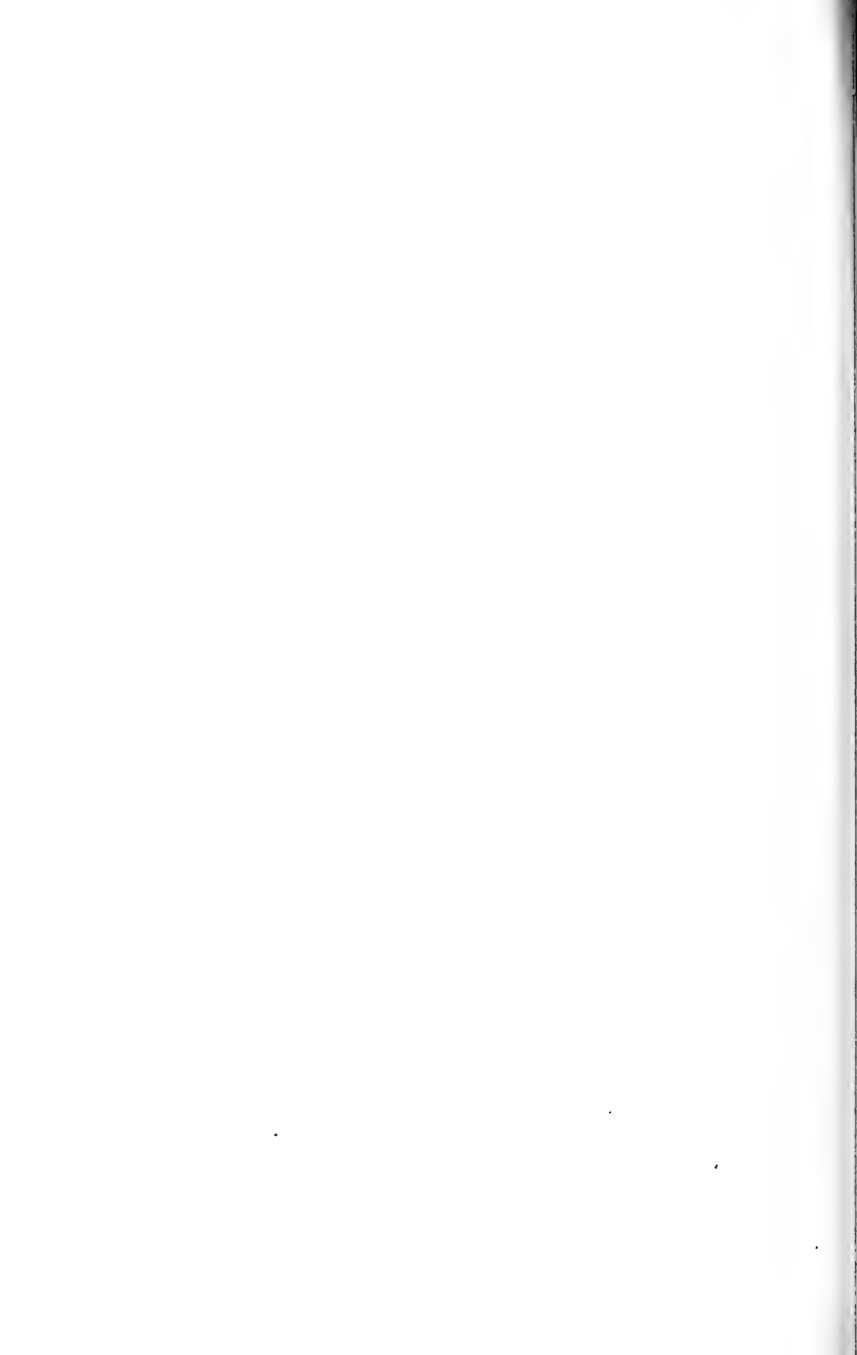


Fig. 180, *Cyclophorus transmorrisonensis* HAYATA; a, the plant, (reduced); b, the same; c, a scale on the rhizome; d, a stellate hair on the frond; b, natural size.



## INDEX.

*Orders in capital type; species in roman type; genera, synonyms and species incidentally mentioned in italic type.*

<b>Acacia</b> WILLD. . . . .	4	<b>Asplenium</b> <i>Mertensianum</i> KZE . . . .	232
„ <i>confusa</i> MERRILL var. <i>Inamurai</i>		„ <i>morrisonense</i> HAYATA . . . .	225
„ HAYATA . . . . .	4	„ <i>pekinense</i> HANCE . . . . .	229
<i>Acanthephippium</i> . . . . .	63	„ <i>planicaule</i> WALL. . . . .	226
<b>Aconitum</b> LINN. . . . .	1	„ <i>prolongatum</i> HOOK. . . . .	227
„ <i>Fukutomei</i> HAYATA . . . .	1	„ <i>resectum</i> SM. form. <i>adiantifrons</i> .	226
„ <i>sachalinense</i> F. SCHMIDT. . . .	2	„ <i>rutae-folium</i> KUNZE. . . . .	227
<b>Actinidia</b> LINDL. . . . .	2	„ <i>scolopendrifrons</i> HAYATA . . . .	227
„ <i>callosa</i> LINDL. var. <i>formosana</i> FINET et GAGN. . . .	2	„ <i>scolopendrioides</i> J. SM. . . . .	228
„ <i>Championi</i> HAYATA . . . .	2	„ <i>tenuicaule</i> HAYATA . . . . .	228
<i>Adenia formosana</i> HAYATA . . . .	8	„ <i>tenuissimum</i> HAYATA . . . .	229
<b>Ailanthus</b> DESF. . . . .	2	„ <i>tozanense</i> HAYATA . . . . .	236
„ <i>glandulosa</i> DESF. var. <i>Tanakai</i> HAYATA. . . . .	2	„ <i>unilaterale</i> LAM. var. <i>obliquissimum</i> HAYATA . . . . .	230
<b>Anectochilus</b> BLUME. . . . .	99	„ <i>viridissimum</i> HAYATA . . . .	231
„ <i>bisaccatus</i> HAYATA . . . .	99	„ <i>Wrightii</i> EAT. var. <i>aristatoserrulatum</i> HAYATA . . . .	232
„ <i>formosanus</i> HAYATA . . . .	101	<b>Athyrium</b> ROTH. . . . .	233
„ <i>grandiflorus</i> LINDL. . . .	101	„ <i>adiantum nigrum</i> (LINN.). . . .	221
„ <i>Inabai</i> HAYATA . . . .	102	„ <i>erythropodium</i> HAYATA . . . .	233
„ <i>koshunensis</i> HAYATA. . . .	101	„ <i>macrocarpum</i> BL. . . . .	231
„ <i>lanceolatus</i> LINDL. . . .	101	„ <i>reflexipinnum</i> HAYATA . . . .	231
„ <i>Roxburghii</i> LINDL. . . .	102	„ <i>rigescens</i> MAENO . . . . .	229
<b>Arisanorchis</b> HAYATA. . . . .	109	„ <i>subrigescens</i> HAYATA. . . .	219
„ <i>Takeoi</i> HAYATA . . . .	110	„ <i>tozanense</i> HAYATA . . . .	235
<b>Aspidium</b> SW. . . . .	188	<b>Beilschmiedia</b> NEES. . . . .	20
„ <i>Lonchitis</i> LOWE . . . . .	196	„ <i>erythrophloia</i> HAYATA. . . .	20
„ <i>submembranaceum</i> HAYATA. . . .	188	<b>Blechnum</b> LINN. . . . .	236
„ <i>subtriphyllum</i> HOOK. . . .	189	„ <i>integripinnum</i> HAYATA . . . .	236
<b>Asplenium</b> LINN. . . . .	221	<b>Boschniakia</b> C. A. MEY . . . .	19
„ <i>adiantum nigrum</i> LINN. . . .	221	„ <i>Kawakamii</i> HAYATA . . . .	19
„ <i>affine</i> SW. . . . .	232	„ <i>kimalaica</i> HK. f. et TH. . . .	19
„ <i>apoense</i> COPELAND . . . .	214	<b>Botrychium</b> SW. . . . .	134
„ <i>caducum</i> WALL. . . . .	197	„ <i>leptostachyum</i> HAYATA . . . .	134
„ <i>ensiforme</i> WALL. . . . .	214	„ <i>virginianum</i> SW. . . . .	135
„ <i>iridiphyllum</i> HAYATA . . . .	223	<b>Bulbophyllum</b> THOU. . . . .	45
„ <i>laserpitifolium</i> LAM. var. <i>morrisonense</i> HAYATA . . . .	225	„ <i>affine</i> LINDL. . . . .	49
„ <i>lasiniatum</i> DON. . . . .	224	„ <i>flavisepalum</i> HAYATA . . . .	45
„ <i>Makinoi</i> HAYATA . . . .	224	„ <i>gracillimum</i> HAYATA . . . .	46
„ <i>Matsumuroi</i> CHRIST. . . .	225	„ <i>Inabai</i> HAYATA . . . .	47
		„ <i>kusukusense</i> HAYATA . . . .	48

<i>Bulbophyllum melanoglossum</i> HAYATA	49	<i>Cornus macrophylla</i> MATSUM. . . . .	12
.. <i>omerandrum</i> HAYATA . . . . .	50	<i>Corylopsis</i> SIEB. et ZUCC. . . . .	6
.. <i>uruiense</i> HAYATA . . . . .	50	.. <i>stenopetala</i> HAYATA . . . . .	6
.. <i>viridiflorum</i> HAYATA . . . . .	51	.. <i>Veitchiana</i> BEAN. . . . .	8
<i>Calanthe</i> R. BR. . . . .	65	<i>Cremastra</i> . . . . .	84
.. <i>arisanensis</i> HAYATA . . . . .	65	.. <i>triloba</i> HAYATA . . . . .	84
.. <i>brevicolumna</i> HAYATA . . . . .	65	.. <i>Wallichii</i> . . . . .	84
.. <i>caudatilabella</i> HAYATA . . . . .	66	<i>Cryptostylis</i> R. BR. . . . .	117
.. <i>forsythiiflora</i> HAYATA . . . . .	67	.. <i>erythroglossa</i> HAYATA . . . . .	117
.. <i>graciliflora</i> HAYATA . . . . .	68	.. <i>filiformis</i> (BLUME) . . . . .	118
.. <i>Henryi</i> ROLFE. . . . .	69	<i>Cyclophorus</i> DESV. . . . .	255
.. <i>herbacea</i> LINDL. . . . .	66	.. <i>grandissimus</i> HAYATA . . . . .	255
.. <i>Kawakamii</i> HAYATA . . . . .	69	.. <i>transmorrisonensis</i> HAYATA . . . . .	256
.. <i>lamellata</i> HAYATA . . . . .	70	<i>Cymbidium</i> SW. . . . .	74
.. <i>reflexa</i> MAXIM. . . . .	71	.. <i>albo-juncidissimum</i> HAYATA. . . . .	74
.. <i>Sasakii</i> HAYATA . . . . .	71	.. <i>aloifolium</i> SWARTZ. . . . .	74
CAPRIFOLIACEE . . . . .	12	.. <i>arrogans</i> HAYATA . . . . .	76
<i>Cephalotaxus</i> ZUCC. . . . .	22	.. <i>ensifolium</i> SW. . . . .	77
.. <i>drupacea</i> S. et Z. . . . .	22	.. <i>formosanum</i> HAYATA . . . . .	77
.. <i>Wilsoniana</i> HAYATA . . . . .	22	.. <i>lanceifolium</i> HOOK. . . . .	79
<i>Cestichis dolichopoda</i> HAYATA . . . . .	27	.. <i>Mackinnoni</i> DUTHIE . . . . .	78
.. <i>Sonni</i> HAYATA . . . . .	33	.. <i>kanran</i> MAK. . . . .	82
<i>Cheirostylis</i> BLUME . . . . .	108	.. <i>illiberale</i> HAYATA . . . . .	78
.. <i>chinensis</i> . . . . .	109	.. <i>misericors</i> HAYATA . . . . .	79
.. <i>Inabai</i> HAYATA . . . . .	108	.. <i>oreophilum</i> HAYATA . . . . .	80
<i>Chinaphila rhombifolia</i> HAYATA . . . . .	17	.. <i>pumilum</i> ROLFE . . . . .	79
<i>Cinnamomum</i> BLUME . . . . .	20	.. <i>purpureo-hiemale</i> HAYATA . . . . .	81
.. <i>Louireirii</i> NEES . . . . .	21	.. <i>simonsianum</i> KING et PANTL. . . . .	82
.. <i>pseudo-louireirii</i> HAYATA . . . . .	20	.. <i>sinense</i> WILLD. . . . .	83
<i>Cirrhopetalum boninense</i> MAKINO . . . . .	51	.. <i>virens</i> LINDL. . . . .	78
.. <i>flaviseptum</i> HAYATA . . . . .	46	<i>Cystopteris</i> BEENHARD. . . . .	143
.. <i>Inabai</i> HAYATA . . . . .	47	.. <i>formosana</i> HAYATA . . . . .	143
.. <i>melanoglossum</i> HAYATA . . . . .	49	.. <i>fragilis</i> BERNH. . . . .	146
.. <i>omerandrum</i> HAYATA . . . . .	50	.. <i>japonica</i> LEVES. . . . .	144
.. <i>uruiense</i> HAYATA . . . . .	51	.. <i>sphaerocarpa</i> HAYATA . . . . .	144
<i>Cleisostoma</i> BLUME. . . . .	95	<i>Davallia</i> SM. . . . .	204
.. <i>brachybotrya</i> HAYATA . . . . .	95	.. <i>platyphylla</i> DON. . . . .	209
.. <i>ionosma</i> LINDL. . . . .	96	.. <i>stenolepis</i> HAYATA . . . . .	204
.. <i>oblongisepala</i> HAYATA . . . . .	96	<i>Dendrobium</i> SW. . . . .	36
.. <i>taiwaniana</i> HAYATA . . . . .	98	.. <i>biflorum</i> SWARTZ . . . . .	40
CONIFERE. . . . .	22	.. <i>candidum</i> WALL. . . . .	41
<i>Coniogramme</i> FÉE. . . . .	237	.. <i>erythroglossum</i> HAYATA . . . . .	36
.. <i>fraxinea</i> FÉE. . . . .	239	.. <i>fimbriatolabellum</i> HAYATA . . . . .	38
.. <i>parvipinnula</i> HAYATA . . . . .	237	.. <i>furcatopedicellatum</i> HAYATA . . . . .	39
<i>Cologyne formosana</i> HAYATA . . . . .	64	.. <i>heishanense</i> HAYATA . . . . .	40
CORNACEE . . . . .	11	.. <i>kwashotense</i> HAYATA . . . . .	41
<i>Cornus</i> LINN. . . . .	11	.. <i>leptocladum</i> HAYATA . . . . .	43
.. <i>controversa</i> HEMSL. . . . .	12	.. <i>longicalcaratum</i> HAYATA . . . . .	43
.. <i>longipetiolata</i> HAYATA . . . . .	11	.. <i>moniliforme</i> SW. . . . .	44



<i>Dendrobium pendulicaule</i> HAYATA .. ..	44	<i>Dryopteris Maximowiczii</i> .. .. .	175
<i>subclausum</i> ROLFE .. .. .	44	<i>melanocarpa</i> HAYATA .. .. .	163
<i>tenuicaule</i> HAYATA .. .. .	43	<i>Miqueliana</i> C. CH. .. .. .	171
<i>Victoria-reginae</i> LOHER. .. ..	44	<i>morrisonensis</i> HAYATA .. .. .	166
<i>Desmotricleum fimbriatolobellum</i> HAYATA ..	38	<i>nigrisquama</i> HAYATA .. .. .	167
DIAPENSIACEAE .. .. .	17	<i>ochthodes</i> C. CH. .. .. .	167
<i>Didymopleris</i> GRIFF. . . . .	119	<i>pachyphylla</i> HAYATA .. .. .	168
<i>subcampanulata</i> HAYATA .. .. .	119	<i>podophylla</i> .. .. .	172
<i>pallens</i> GRIFF. .. .. .	120	<i>pleurolepis</i> HAYATA .. .. .	169
<i>Diplazium</i> Sw. .. .. .	212	<i>prolifera</i> C. CH. .. .. .	170
<i>arisanense</i> HAYATA .. .. .	212	<i>pseudosieboldii</i> HAYATA .. .. .	171
<i>bicuspe</i> HAYATA .. .. .	214	<i>quadrupinnata</i> HAYATA .. .. .	172
<i>costalisorum</i> HAYATA .. .. .	213	<i>reflexipinna</i> HAYATA .. .. .	171
<i>isobasis</i> CHEST. .. .. .	214	<i>reflexosquamata</i> HAYATA .. .. .	176
<i>Kawakamii</i> HAYATA .. .. .	215	<i>remota</i> HAYATA .. .. .	177
<i>leiopodium</i> HAYATA .. .. .	217	<i>serrato-dentata</i> (BEDD.) HAYATA ..	179
<i>Makinoi</i> YABE .. .. .	224	<i>Sieboldii</i> .. .. .	172
<i>tenuicaule</i> HAYATA .. .. .	220	<i>sophoroides</i> O. KTZE. form.	
<i>subrigescens</i> HAYATA .. .. .	219	<i>ensipinna</i> .. .. .	180
<i>Textori</i> (MIQ.) .. .. .	221	<i>spinulosa</i> O. KTZE. var. <i>morrisonensis</i> HAYATA .. .. .	166
<i>Diptoprora</i> Hook. f. .. .. .	86	<i>squamæstipes</i> C. CH. .. .. .	179
<i>Championi</i> .. .. .	87	<i>subdecipiens</i> HAYATA .. .. .	181
<i>kusukusensis</i> HAYATA .. .. .	86	<i>subexaltata</i> C. CH. .. .. .	182
<i>uruiensis</i> HAYATA .. .. .	87	<i>sublaxa</i> HAYATA .. .. .	183
<i>Dryopteris</i> ADANSON .. .. .	116	<i>tenuifrons</i> HAYATA .. .. .	181
<i>africana</i> C. CH. . . . .	187	<i>thrichorhachis</i> HAYATA .. .. .	185
<i>angustodissecta</i> HAYATA .. .. .	146	<i>thysanocarpa</i> HAYATA .. .. .	160
<i>apiciflora</i> O. K. .. .. .	147	<i>transmorrisonense</i> HAYATA .. .. .	187
<i>aurita</i> C. CH. . . . .	148	<i>viridescens</i> (BAKER) O. KTZE. .	188
<i>Bekdomei</i> O. KTZE. .. .. .	151	<i>Yabei</i> HAYATA .. .. .	187
<i>constantissima</i> HAYATA .. .. .	191	<i>Elaphoglossum</i> SCHOTT .. .. .	257
<i>crenata</i> O. KTZE. .. .. .	149	conforme MOORE .. .. .	257
<i>cyrtolepis</i> HAYATA .. .. .	149	<i>Eria</i> LINDL. .. .. .	54
<i>decipiens</i> .. .. .	167	<i>arisanensis</i> HAYATA .. .. .	54
<i>Entoni</i> (BAK.) .. .. .	150	<i>hypomelana</i> HAYATA .. .. .	54
<i>Filix mas</i> var. <i>serrato-dentata</i> BEDD. .. .. .	179	<i>japonica</i> MAX. .. .. .	54
<i>fluvialis</i> HAYATA .. .. .	152	<i>plicatilabella</i> HAYATA .. .. .	55
<i>gracilescens</i> O. KTZE. .. .. .	151	<i>repans</i> MK. .. .. .	54
<i>hirtipes</i> O. KTZE. .. .. .	152	<i>septemlamella</i> HAYATA .. .. .	56
<i>hypophlebia</i> HAYATA .. .. .	154	<i>tomentiflora</i> HAYATA .. .. .	56
<i>Kawakamii</i> HAYATA .. .. .	155	ERICACEAE .. .. .	15
<i>Kodamai</i> HAYATA .. .. .	156	EUTOPIA R. BR. .. .. .	72
<i>kusukusensis</i> HAYATA .. .. .	157	<i>brachycentra</i> HAYATA .. .. .	72
<i>levifrons</i> HAYATA .. .. .	158	<i>herbacea</i> LINDL. .. .. .	73
<i>lepidopoda</i> HAYATA .. .. .	161	<i>raimosa</i> HAYATA .. .. .	73
<i>leptorhachia</i> HAYATA .. .. .	162	<i>Galea</i> BLUME .. .. .	121
<i>leucostipes</i> (BAKER) C. CH. ..	163	<i>kusukusensis</i> HAYATA .. .. .	121
<i>membranoides</i> HAYATA .. .. .	165	<i>Rolfei</i> HAYATA .. .. .	121

<i>Goodyera</i> R. BR. . . . .	111	<i>Ione intermedia</i> KING et PANTLING. . . . .	53
"    bilamellata HAYATA . . . . .	111	"    Sasakii HAYATA . . . . .	52
"    candatilabella HAYATA . . . . .	112	<i>Lactrea apiciflora</i> (HOOK.) BEDD. . . . .	117
"    cyrtoglossa HAYATA . . . . .	113	LAURINEE . . . . .	20
"    foliosa BENTH. . . . .	115	LEGUMINOSAE . . . . .	4
"    Hewyi ROLFE. . . . .	117	<i>Leucostegia</i> PRESL. . . . .	205
"    longibaccata HAYATA . . . . .	114	"    parvipinnula HAYATA . . . . .	205
"    longirostrata HAYATA. . . . .	115	<i>Lindsaya</i> DRY. . . . .	211
"    morrisonicola HAYATA . . . . .	116	"    kusukusensis HAYATA. . . . .	211
"    pachyglossa HAYATA . . . . .	117	<i>Liparis</i> RICH. . . . .	27
"    procera . . . . .	113	"    congesta . . . . .	31
<i>Gossypium</i> LINN. . . . .	21	"    dolichopoda HAYATA . . . . .	27
"    hirsutum var. religiosum WATT. . . . .	2	"    Kawakamii HAYATA . . . . .	28
<i>Gymnogramme acrida</i> HOOK. . . . .	149	"    Hewyi ROLFE . . . . .	33
<i>Gymnopteris</i> BERNH. . . . .	201	"    longipes SCHLECHT . . . . .	27
"    dichotomophlebia HAYATA . . . . .	201	"    maerantha ROLFE . . . . .	28
"    variabilis (BEDD.) . . . . .	202	"    Nakahamii HAYATA . . . . .	29
<i>Habenaria</i> WILLD. . . . .	126	"    platybolba HAYATA. . . . .	30
"    aristata HOOK. f. . . . .	125	"    Sasakii HAYATA . . . . .	32
"    ciliolaris KRANZL. . . . .	128	"    Somai HAYATA . . . . .	33
"    goodyeroides DON var.		"    taiwaniana HAYATA. . . . .	34
formosana HAYATA . . . . .	126	"    Uchiyanu SCHLECHT. . . . .	35
"    goodyeroides HAYATA . . . . .	126	<i>Luisia</i> GAUD. . . . .	85
"    longitentaculata HAYATA . . . . .	127	"    liukiuensis SCHLECHT. . . . .	86
"    linearipetala HAYATA . . . . .	126	"    megasepala HAYATA . . . . .	85
"    Miersiana CHAMP. . . . .	129	"    teves BL. . . . .	86
"    stenopetala LINDL. . . . .	127	LYCOPODIACEE . . . . .	130
"    stenopetala LINDL. var.		<i>Lycopodium</i> LINN. . . . .	130
polytricha HOOK. f. . . . .	128	"    alpinum LINN. var. trans-	
"    tohoensis HAYATA . . . . .	128	morrisonense HAYATA. . . . .	13
HAMAMELIDEAE . . . . .	6	"    carinatum DESV. . . . .	131
<i>Hemipilia</i> LINDL. . . . .	129	"    cunninghamioides HAYATA . . . . .	131
"    formosana HAYATA . . . . .	129	"    cryptomerianum MAX. . . . .	132
<i>Humata granulissana</i> HAYATA . . . . .	200	"    formosanum W. HERTER . . . . .	131
HYDROCHARIDEAE . . . . .	23	"    juniperistachyum HAYATA . . . . .	132
<i>Hydrocharis</i> LINN. . . . .	23	"    pinifolium HAYATA . . . . .	133
"    asiatica Miq. . . . .	23	"    pulcherrimum WALL. . . . .	132
HYMENOPHYLLACEAE . . . . .	135	"    Selago LINN. . . . .	132
<i>Hymenophyllum</i> LINN. . . . .	140	"    serratum TH var. myrio-	
"    constriatum HAYATA . . . . .	140	phyllifolium HAYATA . . . . .	133
"    javanicum SPRENG. . . . .	141	"    squarrosus FORST . . . . .	133
"    parallelocarpum HAYATA. . . . .	141	"    subdistichum MAKINO . . . . .	133
"    polyanthos Sw. . . . .	142	"    taxifolium HAYATA . . . . .	132
"    rurum R. BR. . . . .	142	"    taxifolium HAYATA . . . . .	133
"    Wrightii V. D. BOSCH . . . . .	142	"    tereticule HAYATA . . . . .	133
<i>Hypoleucium Ruykellianum</i> KUNZE . . . . .	149	MALVACEE . . . . .	2
<i>Hypolepis</i> BERNH. . . . .	239	<i>Microlepia</i> PRESL. . . . .	207
"    tennifolia BERNH. . . . .	239	"    grandissima HAYATA . . . . .	207
<i>Ione</i> LINDL. . . . .	52	"    quadripinnata HAYATA . . . . .	172

<i>Microlepia subpinnata</i> HAYATA.. .. .	209	<i>Physurus</i> RICH. . . . .	99
" <i>trichocarpa</i> HAYATA.. .. .	210	" <i>chinensis</i> ROLFE.. .. .	99
<i>Modecca</i> LAM. . . . .	8	<i>Plagiogygia</i> METT. . . . .	239
" <i>formosana</i> HAYATA.. .. .	8	" <i>adnata</i> BEDD. . . . .	239
<i>Moneses</i> SALISB. . . . .	17	" <i>euphlebia</i> METT. . . . .	239
" <i>rhombifolia</i> A. ANDRES.. .. .	17	" <i>falcata</i> COPEL. . . . .	239
<i>Nephrodium odoratum</i> BAKER.. .. .	149	" <i>Hayateana</i> MAENO . . . . .	239
" <i>Totta</i> DIELS . . . . .	1	" <i>Matsunurae</i> HAYATA . . . . .	239
<i>Nephrolepis</i> SCHOTT. . . . .	202	" <i>stenoptera</i> DIELS.. .. .	239
" <i>tenuissimum</i> HAYATA . . . . .	202	<i>Platanthera</i> RICH. . . . .	122
<i>Nervilia</i> GAUD. . . . .	118	" <i>goodyeroides</i> var. <i>for-</i>	
" <i>purpurea</i> HAYATA . . . . .	118	<i>mosana</i> HAYATA . . . . .	126
" <i>yeyamensis</i> HAYATA . . . . .	118	" <i>longibracteata</i> HAYATA.. .. .	122
<i>Nipholobolus costatus</i> (WALL.) . . . . .	256	" <i>obcordata</i> HAYATA . . . . .	124
" <i>fissus</i> HAYATA . . . . .	257	" <i>pachyglossa</i> HAYATA . . . . .	123
" <i>grandissimus</i> HAYATA . . . . .	255	" <i>Pricei</i> . . . . .	126
" <i>Lingua</i> . . . . .	256	" <i>stenoglossa</i> HAYATA . . . . .	123
" <i>transmorrisonensis</i> HAYATA . . . . .	257	" <i>truncatolabellata</i> HAYATA . . . . .	124
<i>Oberonia</i> LINDL. . . . .	23	" sp. (Fig. 66.) . . . . .	125
" <i>arisanensis</i> HAYATA . . . . .	23	<i>Pleione</i> DOX. . . . .	64
" <i>bilobatolabella</i> HAYATA . . . . .	23	" <i>formosana</i> HAYATA . . . . .	64
" <i>formosana</i> HAYATA . . . . .	25	<i>Pleopeltis rostrata</i> HOOK. . . . .	253
" <i>kusukusensis</i> HAYATA . . . . .	26	" <i>hemionitidea</i> MOORE . . . . .	250
<i>Odontochilus bisaccatus</i> HAYATA . . . . .	99	<i>Pogonia Scottii</i> REICHB. . . . .	119
" <i>gravidylorus</i> BENTH . . . . .	104	" <i>plicata</i> LINDL. . . . .	118
" <i>Inabai</i> HAYATA . . . . .	104	POLYPODIACEÆ . . . . .	113
" <i>lanceolatus</i> BENTH . . . . .	101	<i>Polypodium</i> LINN. . . . .	243
ORCHIDEEÆ . . . . .	23	" <i>arisanense</i> HAYATA . . . . .	243
OPHIOGLOSSACEÆ . . . . .	134	" <i>cucullatum</i> HAYATA . . . . .	248
<i>Oreorchis</i> . . . . .	135	" <i>decrescens</i> CHRIST var. <i>blech-</i>	
" <i>Fargesii</i> FINET var. <i>subca-</i>		<i>nifrons</i> HAYATA . . . . .	245
<i>pitata</i> HAYATA . . . . .	35	" <i>falcatopinnatum</i> HAYATA . . . . .	247
OROBANCHEÆ . . . . .	19	" <i>formosana</i> BAKER . . . . .	245
OSMUNDACEÆ . . . . .	135	" <i>gracillimum</i> COPEL. . . . .	248
<i>Osmunda</i> LINN. . . . .	135	" <i>glauclulosum</i> HOOK. . . . .	255
" <i>regalis</i> LINN. var. ? . . . . .	135	" <i>hemionitideum</i> WALL. . . . .	250
<i>Pasania kodathorensis</i> HAYATA.. .. .	21	" <i>lineare</i> THUNB. var. <i>moniliso-</i>	
PASSIFLOREÆ . . . . .	8	<i>rum</i> HAYATA . . . . .	248
<i>Phajus</i> LOUR . . . . .	59	" <i>Meyenianum</i> (SCHOTT) HOOK. . . . .	249
" <i>gracilis</i> HAYATA . . . . .	59	" <i>morrisonense</i> HAYATA . . . . .	250
" <i>maculata</i> LINDL. . . . .	61	" <i>obtusifrons</i> HAYATA . . . . .	250
" <i>undulatmarginata</i> HAYATA . . . . .	59	" <i>Onori</i> FR. et SAV. . . . .	251
<i>Pholidota</i> LINDL. . . . .	64	" <i>pellucidifolium</i> HAYATA . . . . .	250
" <i>uradensis</i> HAYATA . . . . .	64	" <i>pseudotrichomanoides</i> HAYATA . . . . .	251
" LINDL. . . . .	58	" <i>quasipinnatum</i> HAYATA . . . . .	253
" <i>elegans</i> . . . . .	59	" <i>rostratum</i> HOOK. . . . .	253
" <i>Morii</i> HAYATA . . . . .	58	" <i>Thaaitesii</i> BEDD. . . . .	247
<i>Phreatia nebularis</i> . . . . .	59	" <i>trichomanoides</i> SW. . . . .	253
" <i>succiferu</i> . . . . .	59	<i>Polystichum</i> ROTH. . . . .	190

<i>Polystichum aculeatum</i> ROTH. . . . .	190	<i>Saccolabium Soumai</i> HAYATA . . . . .	93
.. <i>atroviridissimum</i> HAYATA. . . . .	190	<i>Sarcanthus</i> LINDL. . . . .	94
.. <i>constantissimum</i> HAYATA. . . . .	191	.. <i>fuscumaculatus</i> HAYATA . . . . .	94
.. <i>falcatipinnum</i> HAYATA . . . . .	192	.. <i>taicaniensis</i> HAYATA . . . . .	98
.. <i>globosorum</i> HAYATA . . . . .	193	SELAGINELLACEÆ . . . . .	129
.. <i>horridipinnum</i> HAYATA . . . . .	195	<i>Selaginella</i> SPRING . . . . .	129
.. <i>ilicifolium</i> DOX. . . . .	196	.. <i>leptophylla</i> . . . . .	130
.. <i>integripinnum</i> HAYATA . . . . .	196	.. <i>stenostachya</i> HAYATA . . . . .	129
.. <i>laserpitilifolium</i> . . . . .	195	<i>Shortia</i> TORR. et GR. . . . .	17
.. <i>louchitoides</i> (CHRIST) . . . . .	157	.. <i>exappenticulata</i> HAYATA. . . . .	18
.. <i>prionoilepis</i> HAYATA. . . . .	197	.. <i>ritoensis</i> HAYATA . . . . .	17
.. <i>rectipinnum</i> HAYATA. . . . .	199	<i>Shortopsis exappenticulata</i> HAYATA. . . . .	18
.. <i>tenuissimum</i> HAYATA. . . . .	254	.. <i>ritoensis</i> HAYATA . . . . .	17
.. <i>transmorisonense</i> HAYATA . . . . .	187	SIMARUBEÆ . . . . .	2
.. TSUS-SIMENE J. SM. . . . .	201	<i>Stauroopsis buchanensis</i> ROLFE . . . . .	96
<i>Pteris</i> LINN. . . . .	239	<i>Tainia</i> BLUME. . . . .	61
.. <i>biaurita</i> LINN. . . . .	212	.. <i>cordifolia</i> HOOK. . . . .	61
.. <i>excelsissima</i> HAYATA . . . . .	239	.. <i>Flaviei</i> SCHLECHT . . . . .	61
.. <i>dactylina</i> HOOK. . . . .	239	.. <i>unguiculata</i> HAYATA. . . . .	61
.. <i>excelsa</i> GAUD. . . . .	211	<i>Tainiopsis unguiculata</i> HAYATA . . . . .	61
.. <i>pellucida</i> PR. . . . .	211	TERNSTROMIACEÆ . . . . .	2
.. <i>setuloso-castulata</i> HAYATA. . . . .	211	<i>Trichomanes</i> SM. . . . .	135
.. <i>tripartita</i> Sw. . . . .	212	.. <i>acuto-obtusum</i> HAYATA . . . . .	135
<i>Quercus</i> LINN. . . . .	21	.. <i>acutum</i> MAKINO . . . . .	139
.. <i>Cornei</i> . . . . .	21	.. <i>bipunctatum</i> POIR.; . . . .	137
.. <i>kodaihoensis</i> HAYATA . . . . .	21	.. <i>cupressifolium</i> HAYATA . . . . .	136
.. <i>Komishii</i> HAYATA . . . . .	21	.. <i>filicium</i> BORY . . . . .	137
.. <i>stenophylloides</i> HAYATA . . . . .	21	.. <i>humile</i> FORST . . . . .	138
.. <i>stenophylla</i> MEK. . . . .	22	.. <i>humile</i> FORST . . . . .	137
RANUNCULACEÆ . . . . .	1	.. <i>japonicum</i> FR. et SAV. . . . .	138
RHAMNEÆ . . . . .	3	.. <i>Makinoi</i> C. CH. . . . .	139
<i>Rhamnus</i> LINN. . . . .	3	.. <i>maximum</i> BLUME . . . . .	138
.. <i>acuminatifolia</i> HAYATA . . . . .	3	.. <i>numm.</i> . . . . .	136
<i>Rhododendron</i> LINN. . . . .	15	.. <i>orientale</i> C. CH. . . . .	138
.. <i>ellipticum</i> MAXIM . . . . .	16	.. <i>palmifolium</i> HAYATA. . . . .	138
.. <i>leopodium</i> HAYATA . . . . .	16	.. <i>rigidum</i> SW.; . . . . .	140
.. <i>Tanakai</i> HAYATA . . . . .	15	.. <i>thysanostomum</i> HAYATA . . . . .	138
ROSACEÆ . . . . .	5	<i>Viburnum</i> LINN. . . . .	12
<i>Rubus</i> LINN. . . . .	5	.. <i>arboricolum</i> HAYATA . . . . .	12
.. <i>glandulosopunctatus</i> HAYATA . . . . .	5	.. <i>farcatum</i> : BLUME . . . . .	11
.. <i>rosaeifolius</i> var. <i>Maximowiczii</i> FOCKE . . . . .	6	.. <i>melanophyllum</i> HAYATA. . . . .	13
<i>Saccolabium</i> BLUME . . . . .	88	.. <i>odoratissimum</i> KER. . . . .	13
.. <i>formosanum</i> HAYATA . . . . .	88	.. <i>propinquum</i> HEMSLE . . . . .	11
.. <i>fuscopunctatum</i> HAYATA . . . . .	89	<i>Vittaria</i> SM. . . . .	213
.. <i>japonicum</i> MAX. . . . .	89	.. <i>arisanensis</i> HAYATA . . . . .	213
.. <i>Matsuran</i> MAKINO. . . . .	90	<i>Zenaidae</i> LINDL. . . . .	106
.. <i>quasipinifolium</i> HAYATA . . . . .	90	.. <i>arisanensis</i> HAYATA . . . . .	106
.. <i>retrocallum</i> HAYATA . . . . .	92	.. <i>reflexa</i> KING et PANTLING . . . . .	107

ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE I.

### Explanation of Pl. I.

*Viburnum arboricolum* HAYATA.

- Fig. 1. A branch.  
2. A flower.  
3. Corolla, expanded.  
4. 5. 6. Stamens, seen from different sides.  
7. An ovary in vertical section.  
8. Fruits.  
9. 10. 11. Putamens, seen from different sides.  
12. Cross section of a putamen.







ICONES PLANTARUM FORMOSANARUM.

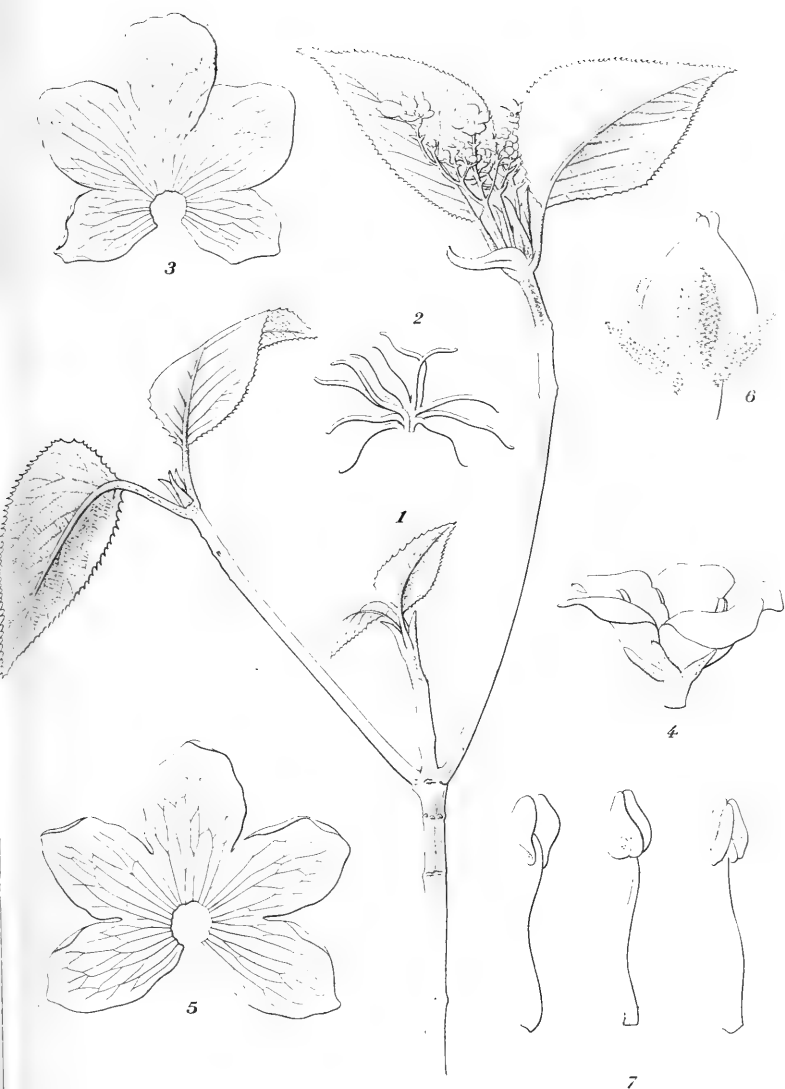
IV.

PLATE II.

## Explanation of Pl. II.

*Viburnum melanophyllum* HAYATA.

- Fig. 1. A branch.  
2. A stellate hair on a leaf.  
3. Corolla of a margin flower.  
4. A fertile flower.  
5. Corolla of the same.  
6. An ovary with calyx and an ovoid style.  
7. Stamens, seen from different sides.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE III.

### Explanation of Pl. III.

*Viburnum propinquum* HEMSL.

- Fig. 1. A branch.  
2. A flower.  
3. Corolla expanded.  
4. A stamen.  
5. Calyx and style.

**1**







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE IV.

### Explanation of Pl. IV.

*Quercus kodaihoensis* HAYATA.

- Fig. 1. A branch.  
2. A leaf.  
3. A fruit.  
4. A glans.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE V.

## Explanation of Pl. V.

*Liparis dolichopoda* HAYATA.

- Fig. 1. The plants in the habitat, (reduced).  
2. The plant.  
3. A part of inflorescence.  
4. A flower.  
5. A lip, seen from front.  
6. The same, seen from back.  
7. The same, showing its apex.  
8. The same, seen from side.  
9. Apical portion of the same, very much magnified.  
10. A column, seen from face.  
11. The same, seen from side.  
12. The same, in section.  
13. An anther, seen from back.  
14, 15. A pollinium, seen from different sides.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE VI.

## Explanation of Pl. VI.

*Liparis Somai* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7, 8, 9. A lip, seen from different sides.  
10. A column.  
11. The same, in section, seen from side.





ICONES PLANTARUM FORMOSANARUM.

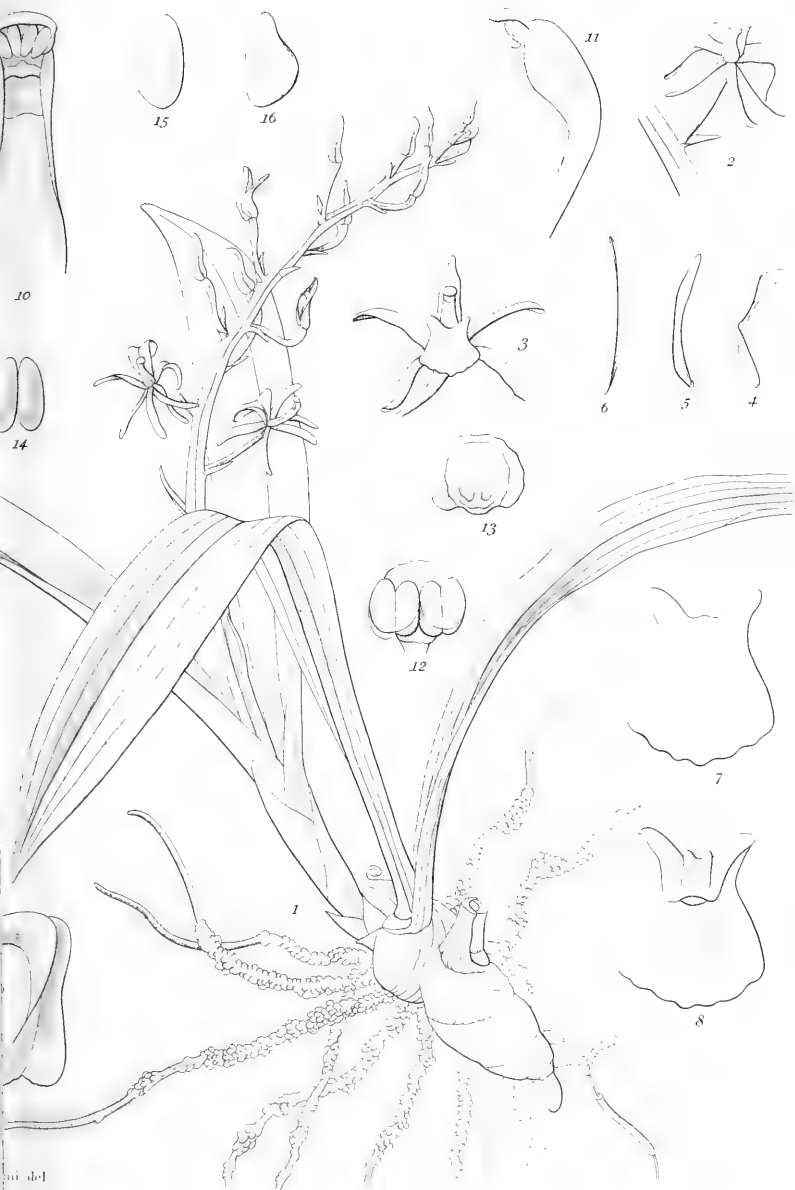
IV.

PLATE VII.

## Explanation of Pl. VII.

*Liparis taiwaniana* HAYATA.

- Fig. 1. The plant.  
2. A part of inflorescence.  
3. A flower.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7, 8, 9. A lip, seen from different sides.  
10. Column, seen from front.  
11. The same, seen from side.  
12. An anther, lifted from the column.  
13. The same, seen from back.  
14. Pollinia.  
15, 16. Pollinium, seen from different sides.







ICONES PLANTARUM FORMOSANARUM.

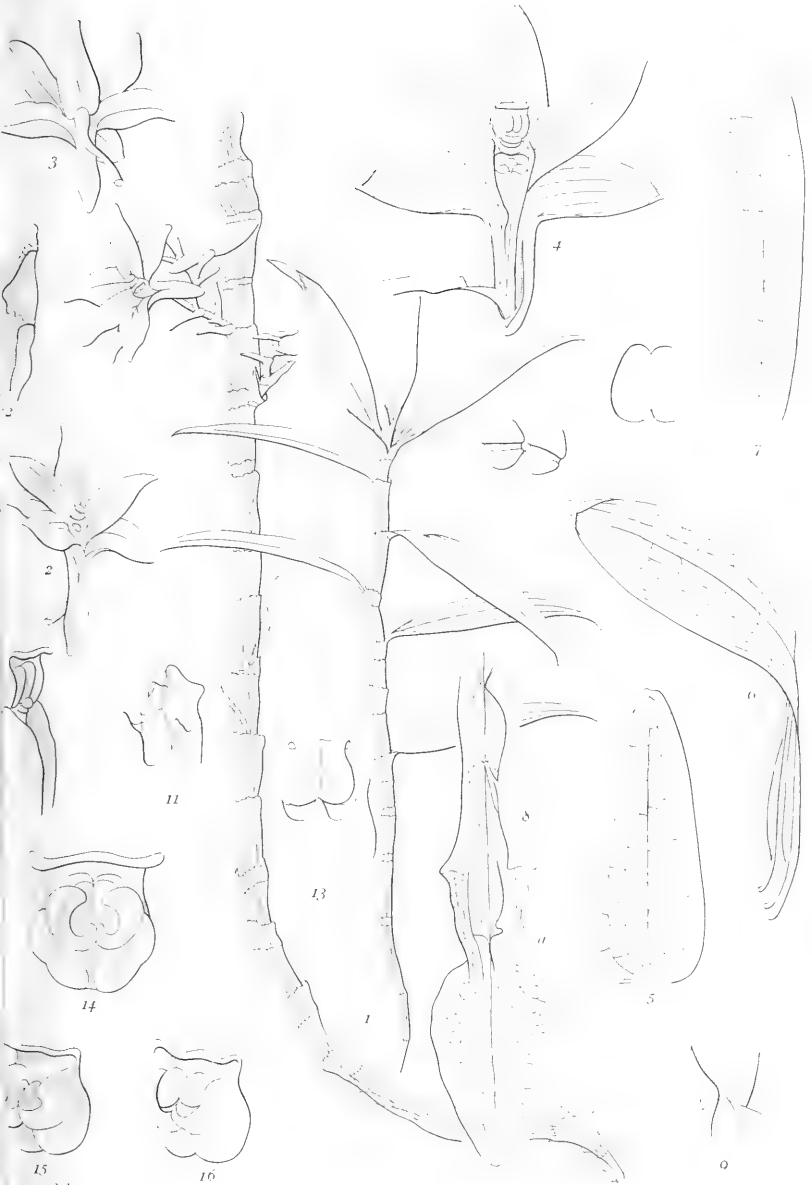
IV.

PLATE VIII.

## Explanation of Pl. VIII.

*Dendrobium longicalcaratum* HAYATA.

- Fig. 1. The plant.
2. A flower, seen from face, lip taken aside.
3. The same, seen from back.
4. The same, seen from front, spur partially taken off to show the column and mentum.
5. A dorsal sepal.
6. A lateral sepal detached from the mentum.
7. A petal.
8. A lip, seen from within.
9. A portion between the claw and lamina of the lip, seen from back.
10. Column, seen from side.
11. The same, seen from back.
12. The same, in section, seen from side.
13. The same, seen from back.
14. An anther with a gland.
15. The same, seen from back, pollinia taken off.
16. The same, with pollinia.
17. Pollinia.
18. The same, seen from below.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE IX.

## Explanation of Pl. IX.

*Bulbophyllum Inabai* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. Mentum and lip.  
7. Columna.  
8. The same, seen from back.  
9. The same, medially cut.  
10. An anther.  
11. The same, seen from back.  
12. Pollinia.  
13. A pollinium, seen from the outer side.  
14. The same, seen from the inner side.



2



3



4



11



10



13



5



12



14



7



9



6



8





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE X.

### Explanation of Pl. X.

*Bulbophyllum melanoglossum* HAYATA.

- Fig. 1. The plant.  
2. A flower (lateral sepals are artificially expanded).  
3. The same, seen from side.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7. A column.  
8. The same, seen from back.  
9. 10. 11. 12. A lip, seen from different sides.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XI.

### Explanation of Pl. XI.

*Bulbophyllum uraiense* HAYATA.

- Fig. 1. The plant.  
2. Central portion of a flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. Column, mentum and lip.  
7. The same, seen from a different side.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XII.

## Explanation of Pl. XII.

*Eria arisanensis* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. The same, seen from back.  
5. The same, seen from face, lip taken off.  
6. A lip.  
7. The same, medially cut.  
8. Apical portion of a column.  
9. The same, seen from side.  
10. The same, in section.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XIII.

### Explanation of Pl. XIII.

*Calceolaria caudatifolia* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. Column and lip.  
7. The same in section.  
8. The same, anther taken off.  
9. Rostellum, clinandrium and anther.  
10. 11. 12. Anther, seen from different sides.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XIV.

## Explanation of Pl. XIV.

*Calanthe forsythiiflora* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. A petal.  
5. A lateral sepal.  
6. A flower, medially cut.  
7. The same flower, sepals and petals taken off, showing column and lip.  
8. A lip, spur medially cut and explicated.  
9. A spur.  
10. 11. 12. An anther, seen from different sides.  
13. 14. Pollinarium, seen from different sides.





ICONES PLANTARUM FORMOSANARUM.

IV.

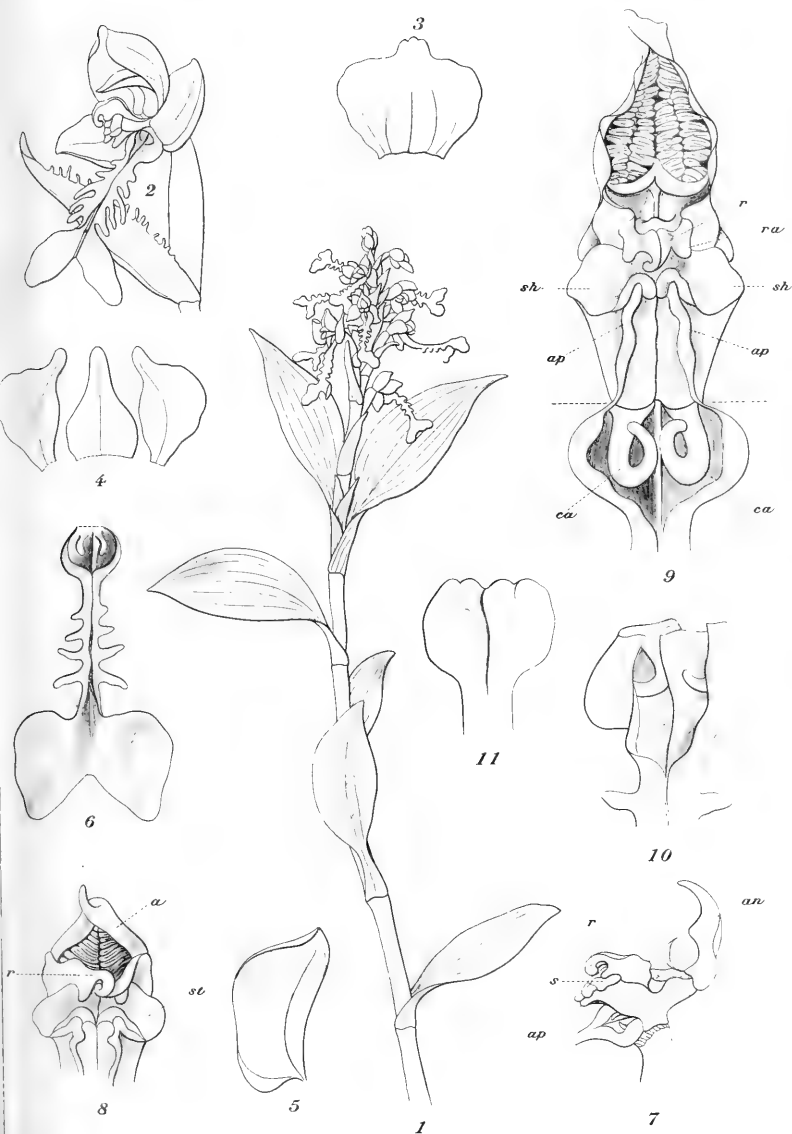
PLATE XV.

## Explanation of Pl. XV.

*Anæctochilus bisaccatus* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal and two petals forming a hood.  
4. The same, a dorsal sepal and petals detached.  
5. A lateral sepal.  
6. A lip.  
7. A column, seen from side, anther a little lifted.  
8. Apical portion of a column.  
9. The same column with the basal portion of the lip.  
10. Basal portion of the same lip.  
11. The same, seen from below.

r, =rostellum; st, sh, s=stigma; a, an=anther; ap=columnal appendages; ra,=lateral lobes of the clinandrium; ca=basal appendages of the lip.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XVI.

## Explanation of Pl. XVI.

*Ancistrochilus Inuloi* HAYATA.

- Fig. 1. The plant.
2. A flower, seen from above.
3. The same, seen from below.
- 4'. A dorsal sepal and petals, forming a hood.
4. The same sepal and petals detached.
5. Two lateral sepals.
6. Central portion of a flower; an=anther, ap=columnal appendages; g=gland.
7. Apical portion of a column, anther taken off; c=clinandrium; r=rostellum; ap=columnal appendage.
8. An anther, seen from below; g=gland.





ICONES PLANTARUM FORMOSANARUM.

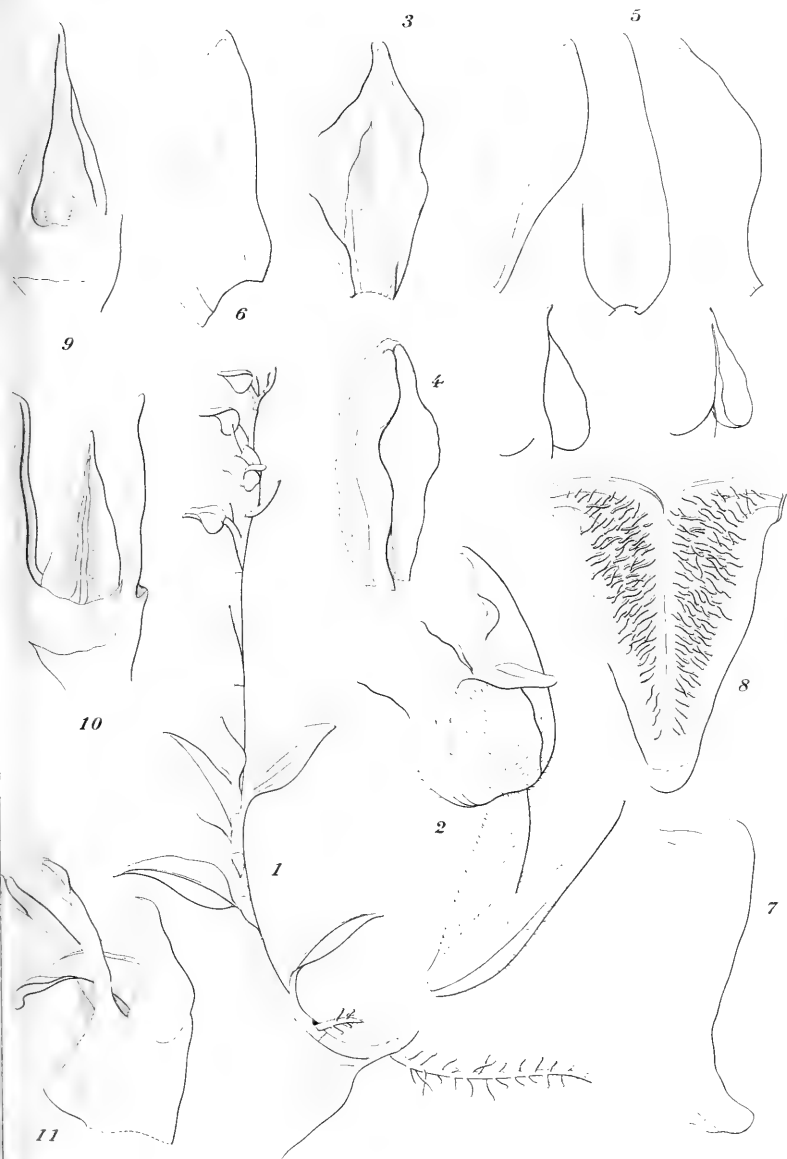
IV.

PLATE XVII.

## Explanation of Pl. XVII.

*Goodyera morrisonicola* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal and two petals forming a hood, seen from within.  
4. A dorsal sepal, seen from side.  
5. A dorsal sepal and two petals detached.  
6. A lateral sepal.  
7. A lip, seen from side.  
8. The same, explicated, seen from within.  
9. Column, seen from front.  
10. The same, rostellum expanded.  
11. The same, seen from side.  
12. An anther, seen from back.  
13. The same, seen from face.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XVIII.

## Explanation of Pl. XVIII.

*Cryptostylis erythroglossa* HAYATA.

- Fig. 1. The plant.  
2. Inflorescence.  
3. A flower.  
4. Central portion of a flower.  
5. The same, seen from back.  
6. A dorsal sepal.  
7. A lateral sepal.  
8. A petal.  
9. A lip.  
10. The same, seen from back.  
11. A clinandrium.  
12. An anther.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XIX.

### Explanation of Pl. XIX.

*Nervilia purpurea* (HAYATA).

- Fig. 1. The plant with a leaf.  
2. A portion of a leaf, showing lamellate hairs.  
3. The plant with a scape.  
4. Another scape.  
5. A lip.  
6. A column, seen from side.  
7. Apical portion of the same, anther lifted.  
8. A column, seen from back.  
9. An ovary.







ICONES PLANTARUM FORMOSANARUM.

IV.

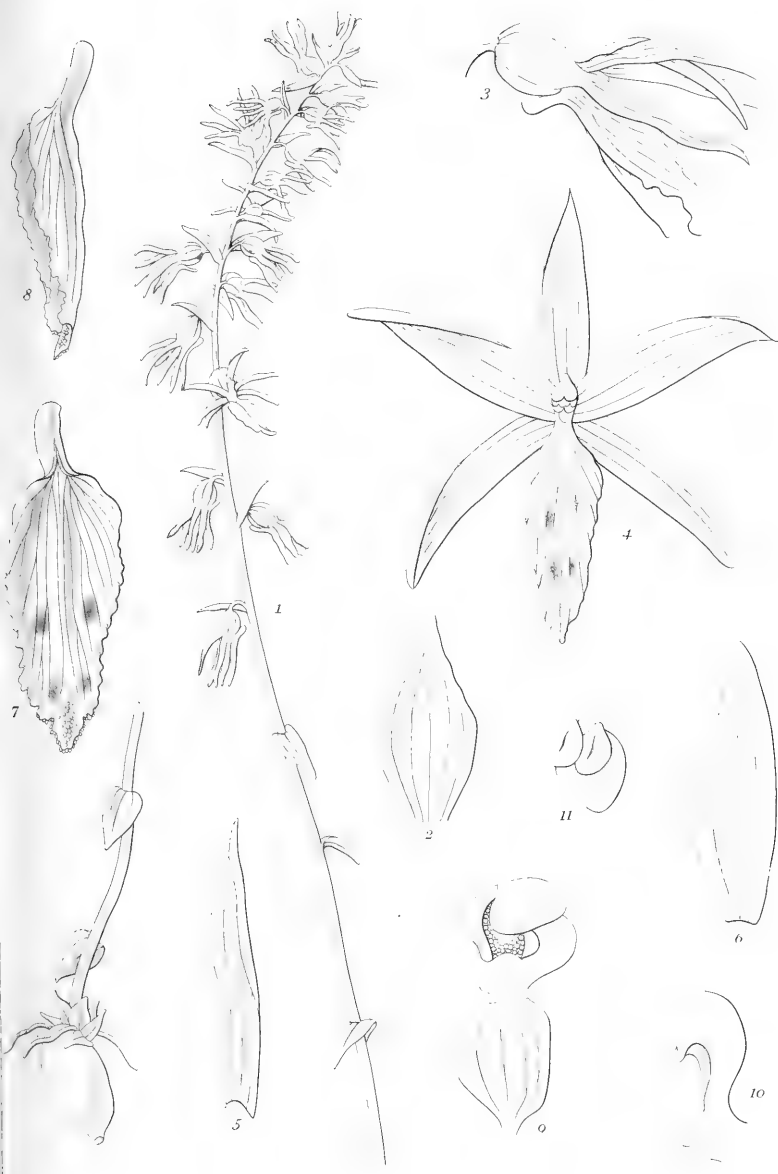
.

PLATE XX.

## Explanation of Pl. XX.

*Galera kusukusensis* HAYATA.

- Fig. 1. The plant.  
2. A scale on a rhachis.  
3. A flower.  
4. The same, segments expanded.  
5. A dorsal sepal.  
6. A petal.  
7. lip, seen from face.  
8. The same, seen from side.  
9. A column and an anther, seen from side.  
10. A column, anther taken off.  
11. An anther.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXI.

### Explanation of Pl. XXI.

*Platanthera pachygloussa* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. The same, seen from back.  
5. Central portion of a flower.  
6. The same in vertical section.  
7. Column, seen from side.  
8. 9. Pollinarium, seen from different sides.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXII.

### Explanation of Pl. XXII.

*Habenaria goodenoides* DON. var. *formosana* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from side.  
4. The same, seen from back.  
5. A dorsal sepal.  
6. A lateral sepal.  
7. A petal.  
8. A lip.  
9. 10. Pollinarium, seen from different sides.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXIII.

### Explanation of Pl. XXIII.

*Habenaria linearipetala* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. A petal.  
6. A lip.  
7. Central portion of a flower.  
8. 9. A staminode, seen from different sides.  
10. A stigma.  
11. The same, seen from back.







ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXIV.

### Explanation of Pl. XXIV.

*Habenaria longitentaculata* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A dorsal sepal.  
4. A lateral sepal.  
5. 6. Lobes of a petal.  
7. A lip.  
8. central part of the flower.  
9, 10. Staminodes.  
11. Stigma.





ICONES PLANTARUM FORMOSANARUM.

IV.

PLATE XXV.

## Explanation of Pl. XXV.

*Hemipilia formosana* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. The same, seen from face.  
4. A dorsal sepal.  
5. A lateral sepal.  
6. A petal.  
7. A lip.  
8. A column and lip, seen from side.  
9. Apical portion of a column.  
10. The same, seen from side.  
11. The same, in section.  
12. The same, seen from back.  
13. 14. Pollinarium, seen from different sides.







**ICONES PLANTARUM FORMOSANARUM**

**NEC NON ET**

**CONTRIBUTIONES AD FLORAM  
FORMOSANAM**

**V**

---

**AUCTORE**

**Bunzō Hayata**



## INTRODUCTION.

As was announced in the introduction to the third volume of this work, the present volume is principally devoted to the third part of those studies which have for the most part been upon new material, collected since 1912.

The volume contains studies on 385 species and 8 varieties ranging from the Ranunculaceæ down to the Polypodiaceæ. All the species of phanerogamous plants are here arranged, as in the preceding volume, after the system of BENTHAM and HOOKER; while those of vascular cryptogams are arranged after the system of ENGLER and PRANTL. Of the species and varieties mentioned in this work, 203 are proposed as new species and 7 are regarded as new varieties of known species, while 182 are identified with species which were already known as from Formosa or from other countries. No new genera are proposed, but 23 genera are mentioned as new to the flora of the island. The genera mentioned in the following list are new to us.

<i>Schizandra</i>	<i>Phæbe</i>	<i>Disporopsis</i>
<i>Perrottetia</i>	<i>Pseudixus</i>	<i>Trillium</i>
<i>Pentapanax</i>	<i>Cyclostemon</i>	<i>Rohdea</i>
<i>Valeriana</i>	<i>Blyxa</i>	<i>Xyris</i>
<i>Linociera</i>	<i>Ottelia</i>	<i>Lophotocarpus</i>
<i>Micrangeria</i>	<i>Burmannia</i>	<i>Archangiopteris</i>
<i>Pedicularis</i>	<i>Hedychium</i>	<i>Notholæna</i>
<i>Aristolochia</i>	<i>Clinogyne</i>	

Species,\* genera\* and families\* now to be added to the flora of Formosa number as many as 213 species, 23 genera and 2 families. Thus, up to the present date, the total number of species of the flora, so far as known, is 3325 species belonging to 914 genera and 160 families.

---

\* It should be understood that plants outside of the island are not counted in this number, although they are mentioned in this volume.

Of all the plants treated in this volume, perhaps the most interesting is a species of the genus *Archangiopteris* belonging to the Marattiaceæ. The genus was first found in Yunnan by Prof. A. HENRY. It was published in 1899 as a new genus by CHRIST and GIESENHAGEN, and the discovery was widely considered to be one of the most striking in the flora of East Asia. Since I have been engaged in the study of the flora of Formosa, I have paid special attention to this group of ferns and have been eagerly looking for another member of this very rare and remarkable genus. Yet, my search was unsuccessful, until late in the spring of this year I happened to examine a curious looking plant labelled *Gymnogramme japonica* in the collection of Mr. T. SŌMA. On examining the plant carefully, to my great joy, I found it to be a new species of *Archangiopteris*, for which I had for so long a time been searching. The species is called *A. Somai* in honour of the gentleman who collected it. Another remarkable novelty is the addition of two families, Burmanniaceæ and Xyrideæ, to the flora of Formosa.

In the course of my studies in the preparation of this volume, I met with a few cases where I found some confusion in determination of genera. As this confusion is, in almost all cases, mainly due to the imperfect character of the original descriptions or to the want of figures, I shall give the cases in some detail as good examples to illustrate the necessity of full descriptions and figures in the case of a new species or genus, as I explained at some length in the introduction to the preceding volume. Among such examples, I may mention *Pseudixus* which was published quite recently by myself as a new genus of the Loranthaceæ, founded on a very common species formerly called *Viscum japonicum* THUNB. Soon after publication, my attention was called to the genus *Bifaria* of VAN TIEGHEM, by Mr. E. D. MERRILL of Manila and Mr. T. SPRAGUE of Kew. *Pseudixus* is apparently closely related to *Bifaria* in having trimerous flowers and in the shape of the internodes. VAN TIEGHEM

fails to give even a short diagnosis of his genus, and adds no figures. But, judging from the detailed accounts given by the author of the tribus *Bifariæ*, which comprises two genera, *Bifaria* and *Korthalsella*, *Bifaria* seems to have male flowers with stamens opposite to the perianth-lobes, as is the case with *Korthalsella*. In establishing *Bifaria*, the author distinguishes at least as many as 56 species, including *Viscum japonicum* THUNB. The latter plant has, however, a unique character, not found in any other loranthaceous plant, i.e. it has stamens alternate to the perianth-lobes. Although VAN TIEGHEM gives no remarks as to the species on which he established his genus, yet it can be easily conjectured that the genus was founded on a species other than *Viscum japonicum*. Yet, at the same time, it can be inferred that VAN TIEGHEM overlooked the above mentioned unique character present in all species of *Bifaria* and consequently placed the genus in the same tribus as *Korthalsella*. All these ambiguities would never have arisen, had the author but furnished a full description of his new genus or figures illustrating it.

This confusion being, for the present, set aside, it is certainly a remarkable fact that *Viscum japonicum* has stamens which are arranged alternately to the perianth-lobes and two-celled anthers which are perfectly united with one another at the center of the flower, but quite free from the perianth-lobes, and which burst, when mature, in the connate suture, or open with a single central pore. In respect of the relative position of stamens to the lobes, the genus, *Pseudixus*, stands without a parallel. No flower with this staminal arrangement has ever been recorded in any other plant of the family. As the relative position of stamens is generally considered an important basis and is almost universally depended on in systematizing flowering plant, *Pseudixus* should certainly, by itself, be regarded as constituting a new tribus, which I propose to call *Pseudixææ*.\*

---

\*For the diagnosis of the new tribus, see p. 187.

Another perplexing plant whose proper genus I found it extremely difficult to determine is *Disporopsis arisanensis* belonging to the Liliaceæ. It is with some hesitation that I have referred the plant to the said genus, whose original description is rather too imperfect to be clearly understood. To begin with the perianth, the description runs "perigonium corollinum, campanulatum, basi leviter saccatum, segmentis 6, subæqualibus, crassiusculis, uninerviis, tubo duplo longioribus." So far, this agrees fairly well with our plant. Then comes the corona "Corona apice tubi inserta, lobis paulo brevior, ultra medium in lacinias 6, staminibus alternantes, lineares, acutas, conniventes, genitalia omnino velantes, fissa." I have been very much puzzled to understand what is meant by the "corona." As to the stamens, it is stated "stamina 6, inter coronæ lobos affixa." The explanation which I shall give to the "corona," judging from the position of the anthers, is that it is a cylindrical tube, composed of dilated filaments which are united one to another and protrude far beyond the insertion of the anthers. but the points of insertion are terminated by the anthers themselves. In other words, the corona is a tube formed by the perfectly united broad filaments which are sagittately 2-lobed at the apex and have anthers at the sinus between the lobes. Then follows "filamentis brevissimis; antheris introrsis, brevibus, dorsifixis, secus margines dehiscentibus. Ovarium sessile, ovoideum, trigastrum, triloculare. Stylus brevis, crassiusculus; stigma punctiforme. Ovula in quoque loculo 4, angulo interno affixa, horizontalia. Bacca.....? Herba rhizomatosa, caulescens,....." If my explanation of the "corona" is correct, our plant perfectly accords with HANCE's original description in the generic characters. The Formosan species has filaments with sagittate apex, partly united, but distinct nearly half way down. The point of difference between HANCE's species and mine is, therefore, whether the filaments are perfectly united one another or connate for half their length.

In this respect, our plant is justly referable to *Disporopsis*. Yet, it is not impossible that the "corona" is quite a different thing from what I have imagined, and that our plant is of a generic character entirely different from that of HANCE's genus. Had the author given but a sketch, however rough, there could have arisen no such confusion.

Other plant, with respect to which I desire to ask my readers' assistance in determining its proper genus, is a species of *Polypodium*, called *P. urceolare*. The fern is undoubtedly a species referable to *Prosaptia* which, according to the leading pteridologists, is considered to be a subgenus of *Davallia*. Yet, quite contrary to current opinion, I have referred it to *Polypodium*. As this matter requires a full explanation too long to be treated here in this Introduction, I shall give my reasons as perfectly as possible in pp. 326-332, in the note on *Polypodium urceolare*.

In the present volume, I give floral sketches of some of my species already described, as I desire to present a clear conception of my species to any one who may examine them to see whether they should be recognized as genuine new species or be reduced to known species; but the original description in each case is not repeated, as the space is here more limited than it was in the preceding volume. Some of the figures contained in the section on phanerogamous plants are reproduced from my field notes drawn from the living material. Though they may be rough in appearance, they are more trustworthy in the exactness of the outline, than those drawn from dried specimens. Almost all woodcuts given in the cryptogamous sections are reproduced from my own sketches which were drawn with the aid of "Zeichenapparat nach Abbe." In such reproductions, the original sketches are usually reduced to  $\frac{1}{2}$  size. Great care has been taken in showing the venation of fronds and the cellular structure of the scales.

I avail myself of this opportunity to tender my hearty thanks to the

officials of the Government of Formosa, to whom I am much indebted for help in the collection of material and in the publication of work. Finally, I must with deep sorrow express my gratitude to the late T. KAWAKAMI, who was so long my collaborator in the Botanical Survey of Formosa and whose brilliant and devoted life came to its close while this volume was in course of publication.

B. HAYATA.

August 1915, Taihoku and Tōkyō.



## Contributions to the Flora of Formosa.

## III.

## Ranunculaceæ.

*Schizandra* MICHX.

**Schizandra arisanensis** HAYATA sp. nov. (Tab. I.). Frutex scandentissimus.

Rami cavi teretes in exsiccatō fusco-purpurascētes, cortice elevato-striato ruguloso haud vel vix lenticellato, lenticellis minutis, cicatricibus foliorum semi-rotundatis vel transverse lunulatis leviter elevatis cupuliforme concavis. Ramuli hornotini foliati in exsiccatō fusco-purpurascētes glaberrimi basi perulis late semirotundatis castaneis ciliatis multiseriatim suffulti. Folia decidua alterna in vivo pallido-viridia in exsiccatō membranacea sub lente pellucido-punctata oblonga vel oblongo-ovata nunquam obovata 6-9 cm. longa 3-4 cm. lata apice cuspidato-acuminata prope basin subito attenuata ad petiolum abeuntia margine prope apicem basinque integra cæterum remote serrulata, serrulis brevissimis obtusis a se 1 cm. remotis, vel margine undulata ad apicem undularum mucronibus obtusis instructa, costa supra impressa subtus elevata, venis venulis utraque pagine elevatis, utraque pagine sub lente minute elevato-punctata glabra, venis primariis utroque latere costæ 7-8, mediis angulo 30° a costa egressis, pagine sub luce transversa pellucido-punctata, petiolis 8-15 mm. longis fuscissimis glabris, stipulis 0. Flores e parte basilari ramulorum hornotinorum foliatorum oriundi racemosim dispositi, ramulo singulo flores 3-4 gerenti. Flores ♂ penduli longe pedicellati, pedicellis 4-5 cm. longis patentissimis pendulis gracillimis glabris basi bractea una instructis, bracteis coriaceis oblongis 7 mm. longis apice rotundatis basi leviter contractis convolutis basin pedicelli amplexantibus margine ciliolatis, bracteola sub pedicello singulo una basi pedicelli sita lineari 2 mm. longa  $\frac{1}{2}$  mm. lata apice obtusissima margine integra ciliolata extus hirsuta intus concava glabra; pedicelli apice cupuliforme dilatati apice  $1\frac{1}{2}$  mm. in diametro. Sepala crassiuscula caduca circ. 7, exteriora majora, interiora minora; exteriora obovata


circ. 1 cm. longa 6 mm. lata apice rotundata basi ad insertionem 2 mm. lata crassiuscula versus marginem tenuiter membranacea subpatentia viridi-flava, interiora rubescentia margine integra sed apice ciliolata intus præsertim apice concava utraque glabra 8 mm. longa. Stamina rubescentia circ. 20 ad torum obovatum affixa, filamentis latiusculis brevissimis dorso complanatis glabris  $\frac{1}{2}$  mm. longis totiusque latis, connectivis obcuneatis 2 mm. longis  $1\frac{1}{2}$  mm. latis apice truncatis vel emarginatis latere loculos antherarum gerentibus, loculis antherarum linearibus circ. 2. mm. longis  $\frac{1}{4}$  mm. latis ad latus connectivorum interiore affixis. Torus staminum obovatus 4 mm. altus brevissime stipitatus. Flores ♀: penduli, pedicelli virides. Sepala exteriora viridia, intermedia flava, interiora minima. Carpella viridia. Torus cylindricus apice acutus 5 mm. longus basi latissimus 2 mm. latus; carpellis dense ad torum spiraliter dispositis numerosis obovoideis  $1\frac{1}{2}$  mm. longis apice latere oblique stigmatiferis, stigmatibus bi-partitis, partibus linearibus superioribus erectis ascendentibus, partibus inferioribus descendentibus ovario firme contactis; carpello 2-ovulato.

HAB. Mt. Arisan: inter Funkiko et Taroyen, leg. R. KANEHIRA, B. HAYATA et I. TANAKA, Aprili. 1914.

Near *Schizandra rubriflora* REHDER et WILSON, but differs from it by the ovately, but not obovately, oblong leaves, more numerous stamens, much smaller carpels and not ciliated stigmas.

## Berberideæ.

### *Podophyllum* LINN.

**Podophyllum Onzoi** HAYATA sp. nov. (Fig. 1). Rhizoma repens teres 12 mm. in diametro dense radiceferum. Caulis solitarius erectus teres glaber apice foliis duobus terminatus 18 cm. longus basi squamis 4-5 suffultus, squamis scariosis ovato-triangularibus 2-3 cm. longis apice obtusis multinerviis stramineis glabris. Folia duo furcatim sita a se angulo 45° divaricata petiolata, lamina peltata fere orbicularis vel late rotundata latior quam longior 25 cm. longa 28 cm. lata -formis margine leviter 8-lobata, lobis perfecte latissime triangularibus 2-5 cm. longis 5-10 cm. latis, margine regulariter serrulata, serrulis mucroniformibus 1-1½ mm. longis a se 2 mm

remotis, utraque glaberrima, centro peltæ laminæ paullo eccentrico ab extremitate superiore 16 cm. et ab ea inferiore 10 cm. distant, palmatim 8-nervia, nervis a se angulo  $40^\circ$  egressis apice ad apicem loborum attingentibus subrectis subramosis, herbacea membranacea supra pallido-viridis subtus pallidissima, petiolis 21 cm. longis glabris basin petioli alterius amplexantibus. Flores ad furcam inter petiolos fasciculatim siti in specimine nostro duobus evolutis cæteris reductis, longe pedicellati penduli, pedicellis glabris gracillimis 4 cm. longis. Flores apertientes haud patentes semper semiclausi. Sepala 3 caducissima virido-pallidissima circ. 2 cm. longa 8-10 mm. lata lineari-oblonga

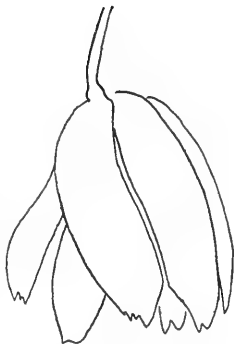


Fig. 1, *Podophyllum Onzoi*  
HAYATA; a flower, natural size.

apice obtusissima vel truncata vel rotundata basi leviter contracta 2 mm. lata membranacea semihyalina margine integra subrecta haud patentia ante anthesin decidua 7-nervia glabra intus concava apice cuculliforme concava extus convexa. Petala 6 rubro-atro-purpurascens oblanceolata haud patentia semper semi-clausa oblanceolata circ. 5 cm. longa 13-15 mm. lata apice acuta vel truncata basi cuneata ad insertionem  $1\frac{1}{2}$  mm. latam abeuntia margine integra apice parte truncata interdum eroso-dentata generaliter integerrima nunquam crispata semper plana membranacea plus minus interiore recurva glaberrima. Stamina 6 pallido-flavo-viridia, filamentis glabris 1 cm. longis subteretibus plus minus complanatis, antheris linearibus 13 mm. longis 3 mm. latis adnatis apice connectivis plus minus apiculatis. Ovarium pallido-flavo-viride glabrum oblongum 5 mm. longum 3-4 mm. latum stipitatum, stipite 2 mm. longo validissimo. Stylus 3 mm. longus columniformis apice dilatatus apice ad stigma peltatum expansus, stigmate dilato peltato supra concavo 6 mm. in diametro margine tenuiter 3-lobato margine validissime undulato-plicato. Ovarium 1-loculare, placentis singulis parietalibus lateralibus ovula numerosissima gerentibus, ovulis erectis anatropis.

HAB. Mt. Arisan: Seuninbora, secus fossas crescens, rarissima, leg. Onzō, Aprili. 1914.

Closely allied to *Podophyllum plicatum* HANCE (Bot. Mag. t. 7098), but distinguishable from it in the narrower, not curled, petals, much larger stigmas and in the anthers with produced connectives.

*Berberis* LINN

**Berberis Kawakamii** HAYATA Ic. Pl. Formos. I. p. 40, t. 9.

HAB. Mt. Arisan, prope Mingetsukei, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914. Flowers yellow, ovary reddish.

**Berberis mingetsensis** HAYATA sp. nov. (Tab. II.) Frutex; ramuli gracilissimi in exsiccato albo-cinerascentes tetragoni vel hexagoni longitudinaliter elevato-rugulosi albo-cinerascentes, spinis ternatis a se angulo  $100^\circ$  egressis 13 mm. longis gracilibus medio  $\frac{1}{2}$  mm. latis acutis, ternis spinarum remote alternis a se 3-5 cm. distantibus. Folia ad axillas spinarum ternatim sitarum insita ternatim fasciculata (ternis alternis) lanceolata  $5\frac{1}{2}$ -9 cm. longa  $1\frac{1}{3}$ - $2\frac{1}{2}$  cm. lata apice triangulari-acuminata laud cuspidata ad summum aristata basi cuneata margine remote tenuiterque aristato-serrulata, serrulis tenuissimis a se 5 mm. remotis arista 1 mm. longa instructis ascendentibus, utraque glabra supra nitida subtus glauca basi cuneata prope basin integra, costa supra impressa subtus elevata, venis venulis utrinque elevatis reticulatis, venis lateralibus primariis utroque latere costae 6-8 rectis a costa angulo  $45^\circ$  egressis circ. ad medium furcatim ramosis cum iis superioribus continuis, chartacea, petiolis 3 mm. longis intus profunde sulcatis. Flores ad axillas spinarum 3-5 fasciculatim siti vel ad apicem ramulorum brevissime reductorum fasciculatim dispositi, fasciculis basi perulis multis suffultis, perulis oblongo-triangularibus 3 mm. longis acutis glabris intus concavis, pedicellis glabris minus quam 1 cm. longis apice plus minus dilatatis apice sub basi floris bracteolis duabus instructis, bracteolis firme sepalo contactis triangularibus  $1\frac{1}{3}$  mm. longis totiusque latis apice cuspidatis intus leviter concavis basi leviter contractis integris extus dorso prominente carinatis glabris deciduis. Sepala virido-flavescentia 8 decussatim 4-seriatim disposita, exteriora minora in flore apertienti exteriore reflexa vel patentia, interiora majora suberecta vel patentia oblongo-rotundata 5 mm. longa  $3\frac{1}{2}$  mm. lata apice rotundata basi truncata contracta ad insertionem  $\frac{1}{4}$  mm. lata margine integra intus concava extus convexa tenuiter 5-nervia. Petala 4 virido-flavescentia erecta sepalis inclusa obovata 3 mm. longa  $2\frac{1}{2}$  mm. lata

apice leviter 2-lobata basi cuneata ad  $\frac{1}{3}$  mm. latum abeuntia subintegra vel apice crosa intus valde concava extus convexa basi glandulis 2 instructa, glandulis oblongo-ovatis  $\frac{2}{3}$  mm. longis  $\frac{1}{4}$  mm. latis apice acuminatis basi rotundatis petalis firme adnatis a basi petali  $\frac{1}{2}$  mm. distantibus  $\sigma$ -formiter dispositis. Stamina 4-5 basi petali affixa, filamentis subcomplanatis basi contractis angustissimis supra basin dilatatis sursum gradatim rostratis ad connectivum abeuntibus, antheris adnatis oblongis  $1\frac{1}{3}$  mm. longis  $1\frac{1}{4}$  mm. latis, loculis valva una exteriore dehiscens, connectivis apice productis truncatis. Ovarium viride glabrum oblongo-cylindraceum  $2\frac{1}{2}$  mm. longum 1 mm. latum 1-loculare 3-4 ovulatum, stigmate sessili peltato plus quam 1 mm. in diametro, ovulis e fundo cavi ovarii oriundis erectis anatropis.

HAB. Mt. Arisan, Mingetsukei, leg. B. HAYATA, Aprili. 1914.

Remarkable for the very slender branches, and the leaves which are glaucous beneath, and for the flowers with subpatent sepals and greenish ovary.

*Mahonia* NUTT.

**Mahonia tikushiensis** HAYATA sp. nov. Frutex. Folia ad apicem ramuli approximativ sita subsessilia circ. 25 cm. longa circ. 10 cm. lata in ambitu elongato-oblonga pinnata 9-11-foliolata; foliolo terminali valde coriaceo nitido ovato-oblongo circ. 7 cm. longo 4 cm. lato apice cuspidato-acuto basi rotundato leviter cordato margine crassissime marginato remote dentato, dentibus a se circ.  $1\frac{1}{2}$  cm. distantibus apice arista instructis, aristis 2 mm. longis rectis ascendentibus, utraque pagine glabro nitido supra viridi subtus pallidissimo-flavescenti, costa supra tenuiter impressa subtus elevata, 5-7-nervio, nervis subrectis prope marginem ramosis curvatis evanescentibus utraque pagine tenuiter elevatis, venulis reticulatis supra plus subtus minus elevatis vel subtus obscuris; foliolis lateralibus sessilibus oppositis, mediis magnis cum foliolum terminale in magnitudine subaequantibus, intimis minimis, mediis ovato-oblongis 7 cm. longis 4 cm. latis basi valde obliquis cordatis, petiolulo terminali 23 mm. longo, interjugis  $3\frac{1}{2}$  cm. longis supra angulato-elevatis subtus rotundatis (in sectione); rhachis ad nodos tumida transverse articulativ striata; petiolis  $1\frac{1}{2}$  cm. longis valde dilatatis caulem semi-amplectantibus apice stipuliferis, stipulis linearibus 6-7 mm. longis angulo recto a petiolo divaricatis glabris. Racemi ad apicem rami congesti recurvi patentes circ. 10 cm. longi, pedunculis (partibus

non-floriferis) 2 cm. longis basi perulis ovato-acutis suffultis. Flores densiuscule dispositi, bracteis sub pedicello ovatis  $3\frac{1}{2}$  mm. longis  $2\frac{1}{2}$  mm. latis apice obtusissimis concavis, pedicellis 6 mm. longis glabris apice plus minus dilatatis. Sepala 9 tri-seriatim disposita, exteriora minora ovato-rotundata  $2\frac{1}{2}$  mm. longa 2 mm. lata intus valde concava margine integra, intermedia majora ovato-oblonga 5 mm. longa  $3\frac{1}{2}$  mm. lata apice obtusissima basi ad insertionem ad 1 mm. lata intus valde concava, intima obovato-oblonga 7 mm. longa 4 mm. lata apice obtusissima basi obtusa ad insertionem  $\frac{1}{2}$  mm. lata margine integra intus valde concava erecta haud patentia. Petala 6 obovato-oblonga  $5\frac{1}{2}$  mm. longa 3 mm. lata apice in ambitu rotundata ad centrum profunde ad 1 mm. 2-lobata (lobis se contactis apice rotundatis) basi obtusa ad insertionem  $\frac{1}{2}$  mm. lata margine integra vel eroso-denticulata utraque facie glabra basi intus glandulis oblongis  $1\frac{1}{2}$  mm. longis adnatis duabus instructa. Stamina 6 petalis opposita inclusa  $3\frac{1}{2}$  mm. longa glabra ad basin petali affixa, filamentis supra basin liberis  $2\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis crassiusculis, antheris oblongis apice truncatis basi cum filamento aequalis, connectivis plus minus productis, loculis parallelis extrorsum valvis singulis dehiscentibus. Ovarium ampulli-forme glabrum cum stipite stigmatique 3 mm. longum  $1\frac{1}{3}$  mm. latum, stipite  $\frac{2}{3}$  mm. longo totiusque lato, apice angustatum 1-loculare 6-ovulatum, ovulis fundo cavi sitis erectis stipitatis anatropis; stigmate sessili plus minus dilatato peltiformi  $\frac{2}{3}$  mm. in diametro ad centrum paullo depresso.

HAB. Tikushizan, leg. Y. SHIMADA, Mart. 1915 (Fl.)

Closely related to *Muhonia japonica* (THG.) DC., but separable from it by the much broader leaflets and by the petals which are in our species much broader and more deeply lobed at the apex, than in the Japanese. The lobes of the petals of *M. japonica* are smaller and slightly acute, while those of our species are larger and quite obtuse at the apex.

## Pittosporeæ.

### *Pittosporum* BANKS.

***Pittosporum daphniphylloides* HAYATA** Mater. Fl. Formos. p. 34. Descriptio auctata: Epiphytica, ad truncos arboris crescens. Cymæ ad apicem ramorum aggregatim sitæ basi cataphyllis linearibus multis instructæ, cymis

pedunculatis, pedunculis 3-5 cm. longis apice dense ramosis profuse florigeris, bracteis linearibus, pedicellis 5 mm. longis breve hirsutis medio 1-bracteatis, bracteis ovatis  $1\frac{1}{3}$  mm. longis  $\frac{2}{3}$  mm. latis glabris apice obtusissimis vel subrotundatis basi plus minus contractis margine glanduloso-ciliolatis intus concavis extus convexis medio crassiusculis margine tenuissimis ad marginem plus minus extrorsum recurvis vel haud recurvis. Sepala 5 basi plus minus connata oblonga 2 mm. longa  $1\frac{1}{4}$  mm. lata glabra apice obtusissima vel subrotundata basi plus minus contracta margine glanduloso-ciliolata medio crassiuscula margine tenuissima intus concava extus convexa suberecta vel leviter patentia haud recurva plus minus basi imbricata. Petala 5 subimbricata lineari-oblonga 7 mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi plus minus angustiora basi ad insertionem 1 mm. lata margine integra medio leviter extrorse recurva sursum ad marginem extrorse plicata, partibus plicatis  $\frac{1}{2}$  mm. latis, utraque pagine glabra a basi usque supra medium erecta sursum subito extrorse recurvo-patentia 3-nerviâ, nervis basi usque ad supra medium haud ramosis sursum venulatis subparallelis, venulis reticulatis. Stamina 5,  $6\frac{1}{2}$  mm. longa petalis breviora, filamentis 5 mm. longis teretibus glabris, antheris linearibus 2 mm. longis 1 mm. latis glabris apice obtusis ad summum minutissime apiculatis basi profunde 2-lobatis  $\frac{3}{4}$  mm. longis. Ovarium obovoideum  $2\frac{1}{2}$  mm. longum  $1\frac{2}{3}$  mm. latum apice subito ad stylum abeuns basi plus minus angustatum ad basin 1 mm. latum hirsutum 1-loculare 2-placentiferum, placentis parietalibus multiovulatis; stylo columniformi 2 mm. longo  $\frac{1}{3}$  mm. lato glabro apice obtuso, stigmate valde oblique truncato ad centrum impresso.

HAB. Mt. Arisan, inter Heishana et Nimandaira, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

**Pittosporum oligospermum** HAYATA (Fig. 2) Mater. Fl. Formos. p. 35.

Descriptio auctata: Flores ad apicem ramorum racemosim dispositi; rhachis racemi interdum brevissima ad nullum reducta, tunc flores umbellatim dispositi, tunc umbellis sessilibus 10-20 radiatis basi perulis cataphyllisque dense multiseriatim suffultis, perulis exterioribus late rotundatis 1-2 mm. longis acutis vel obtusis, interioribus gradatim longioribus lanceolatis vel tandem linearibus 2-4 mm. longis hirsutis vel glabratibus; radiis umbellarum vel pedicellis 1-3 cm. longis gracilibus glabris basi vel ad medium 1-2-bracteatis,

bracteis minutis rotundato-triangularibus  $\frac{1}{2}$  mm. longis ciliatis extus hirsutis intus glabris; pedicellis unifloriferis ad summum cum calyce articulatis. Calyx  $1\frac{1}{3}$  mm. longus obconicus basi 1 mm. latus apice  $2\frac{1}{3}$  mm. latus 5-lobatus, lobis suberectis haud patentibus obtuse triangularibus 1 mm. latis  $\frac{2}{3}$  mm. longis latioribus quam longioribus apice obtusissimis basi haud contractis margine ciliolatis utraque pagine glabris. Petala 5 imbricata flava spathulata  $5\frac{1}{2}$  mm. longa 2 mm. lata apice rotundata supra medium deorsum cuneato-angustata ad  $\frac{2}{3}$  mm. lata abeuntia ad basin  $\frac{2}{3}$  mm. lata a basi usque ad supra medium erecta supra medium subito exteriore recurva patentissima margine apice et prope apicem minute denticulata vel ciliolata cæterum integerrima utraque pagine glabra. Stamina 5, filamentis glabris teretibus 4 mm. longis, antheris ovato-oblongis vel ovato-lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis apice gradatim acuminatis ad summum obtusis basi latissimis 2-lobatis. Ovarium stipitatum, stipite  $1\frac{1}{2}$  mm. longo cum ovario densissime molliter villosio validiusculo, oblongum  $1\frac{1}{2}$  mm. longum cum stipite æquilongum 1-loculare, placentis 3 parietalibus 2-seriatim ovuliferis; stylo columniformi 2 mm. longo glabro apice perfecte truncato.

HAB. Mt. Arisan: inter Jujiro et Heishana, leg. R. KANEHIRA et T. TANAKA, Aprili. 1914.

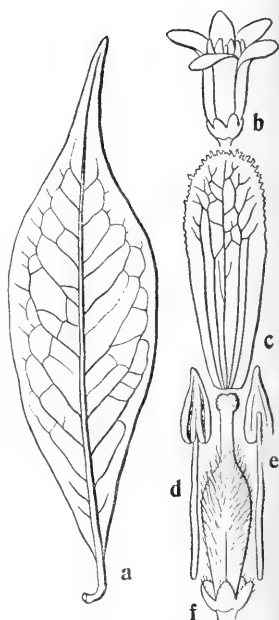


Fig. 2, *Pittosporum oligospermum* HAYATA; a, a leaf, natural size; b, a flower,  $\times 2.5$ ; c, a petal,  $\times 5$ ; d, e, stamens, seen from different sides,  $\times 5$ ; f, ovary,  $\times 5$ .

### Ternstroemiaceæ.

*Stachyurus* SIEB. et ZUCC.

*Stachyurus himalaicus* HOOK. f. et THOMS. (Fig. 3), HOOK. f. Fl. Brit.



Ind. I. p. 288; *Stachyurus præcox* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 48 (non SIEB. et ZUCC.)

HAB. Mt. Arisan, inter Heishana et Nimandaira, leg. B. HAYATA, Mart. 1914.

The description given in Hook. Fl. Brit. Ind. is as follows: "A small tree with straggling branches. Leaves 4-6 by  $1\frac{1}{2}$ -2 in., ovate, with a rounded base, finely serrate, the veins strongly reticulated beneath; petioles  $\frac{1}{2}$ - $\frac{3}{4}$  in. Spikes 2-3 in., erect. Berries the size of a small pea."

Our plant does not very exactly accord with the above description. It is nearer to the Himalayan species than to the Japanese *S. præcox*. In our plant, the rhaches of the spikes are greenish; sepals, petals and filaments are greenish white; ovary deep green, more or less angulate at the top. Flowers of the Japanese species are usually bright yellow.

*Thea* LINN.

*Thea salicifolia* (CHAMP.) SEEM.  
(Fig. 4), BENTH. Fl. Hongk. p. 30.

HAB. Mt. Arisan, inter Karapin et Funkiko, leg. B. HAYATA, Mart. 1914.

"A shrub or a small tree, the young branches and under side of the leaves loosely covered with soft spreading hairs. Leaves lanceolate or oblong, acuminate, about 3 in. long, glabrous above, of a thinner consistence than in the other species. Flowers white, very shortly pedunculate or nearly sessile, drooping. Sepals ovate lanceolate, long-pointed. Petals, especially the inner ones, broader, larger, with shorter points, all slightly silky-hairy and pubescent outside.....Capsules glabrous, beaked."—BENTH. Fl. Hongk. p. 30. Our specimens exactly agree with the description given

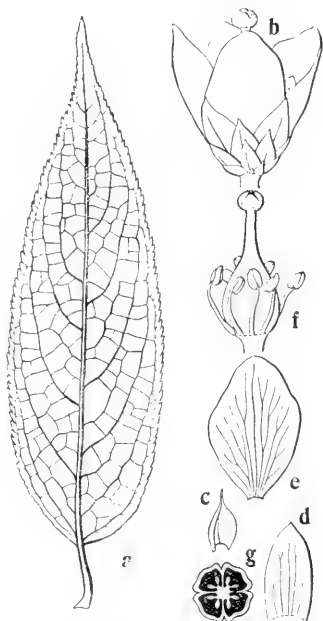


Fig. 3, *Stachyurus himalaicus* Hook. f.; a, a leaf; b, a flower; c, a bract; d, a sepal; e, a petal; f, ovary and stamens; g, cross section of the ovary; a, natural size, others  $\times 4$ .

above, except the fruits which are in the our plant not yet known.

***Thea transarisanensis*** HAYATA n. n. *Thea parvifolia* HAYATA Ic. Pl. Formos. III. p. 45, t. 6, (non SALISB.)

HAB. Mt. Arisan, Mingetzu, leg. B. HAYATA, Mart. 1914.

### Rutaceæ.

#### *Skimmia* THUNB.

***Skimmia distincte-venulosa*** HAYATA sp. nov. (Fig. 5-a).

Frutex circ. 2 m. altus; rami scandentes, cortice nitido cinerascenti longitudinaliter ruguloso, sub pulvino acuto-angulati in exsiccato rubro-fulvescentes subglabri. Folia versus apicem ramorum approximativim alternatimque sita oblongo-oblanccolata 10-13 cm. longa 30-38 mm. lata apice caudato-acuminata ad summum obtusa basi a

medio deorsum gradatim cuneata margine deorsum leviter recurva integerrima sed in exsiccato leviter undulata tenuiter chartacea vel membranacco-chartacea utraque pagine glaberrima sed supra ad costam brevissime hirsuta, costa supra impressa subtus prominente elevata, pagina supra in exsiccato pallida subtus pallidissima, venis lateralibus primariis supra haud impressis haud vel vex elevatis haud vel vex visis subtus tenuissime elevatis utroque latere costæ 6-7 rectis, mediis a costa angulo 45°-50° egressis sursum furcatim ramosis, venulis sub luce traversa distincte visis distincte reticulatis, reticulis ramulas venularum liberas furcatim ramosas includentibus, petiolis subteretibus 6-7 mm. longis intus profunde sulcatis glabris subalatis. Panicula subpyramidalis cum pedunculo

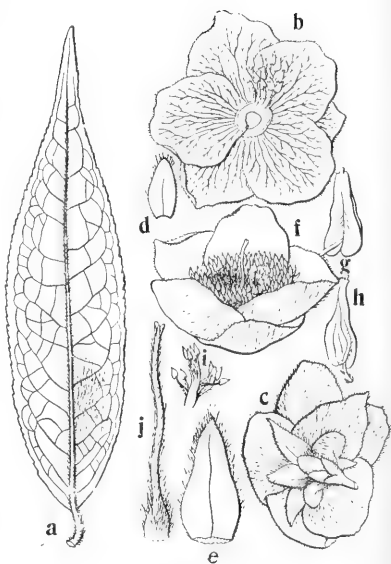


Fig. 4, *Thea salicifolia* (CHAMP.) a, a leaf; b, a flower, stamens nearly taken off; c, the same, seen from back; d, a bract; e, a sepal; f, a flower; g, h, anthers, seen from different sides; i, portion of monadelphous stamens; j, ovary; a, b, c, f, i, natural size; d, e, j,  $\times 2$ ; g, h,  $\times 4$ .

6 cm. longa totiusque lata profuse florifera et profuse ramosa, pedicellis ultimis puberulis 8 mm. longis basi bracteis singulis medio bracteolis duabus instructis; bracteis late rotundatis  $\frac{2}{3}$  mm. in diametro margine ciliolatis, bracteolis late rotundatis  $\frac{1}{2}$  mm. latis totiusque longis margine ciliolatis. Fl. ♂: Sepala subtriangularia glabra prope medium crassiuscula 1 mm. longa  $1\frac{1}{2}$  mm. lata margine tenuissima subintegra haud vel vix extus convexa intus plana apice obtusissima basi leviter contracta. Petala 4-5 alba oblonga 5 mm. longa 3 mm. lata apice obtusa basi obtusa ad insertionem  $\frac{2}{3}$  mm. lata margine croso-integra. Stamina 5 or 4, filamentis 3 mm. longis basi validiusculis sursum gradatim tenuibus, antheris ovato-oblongis  $1\frac{1}{2}$  mm. longis  $1\frac{1}{3}$  mm. latis apice obtusissimis basi tenuiter (haud valde) lobatis vel solum emarginatis. Rudimentum ovarii conicum  $\frac{1}{2}$  mm. longum 1 mm. latum rugulosum apice obtusissimum. Fl. ♀ ignoti.

HAB. Mt. Arisan, inter Arisan et Mingetzu, leg. TAKEO ITÔ et B. HAYATA, Aprili. 1914.

Near *Skimmia melanocarpa* REHDER et WILSON, but distinguishable from it by the larger panicles and much more rounded petals and by the leaves which are always obtuse at the apex of the acumens.

*Skimmia arisanensis* HAYATA, *S. distincte-venulosa* HAYATA and *S. orthoclada* HAYATA resemble one another very closely. *Skimmia orthoclada* differs from the other two by the thinnest and largest leaves with the canaliculated costa on the upper surface and by its smallest form attaining less than 2 meters, with erect stems and branches; *S. distincte-venulosa* distinguishes itself by its narrowest oblanceolate leaves with visible peculiar reticulations of the veinlets; while *S. arisanensis* HAY. differs from *S. orthoclada* in much larger form, in its smaller thicker leaves with elevated costa on the upper surface, and from *S. distincte-venulosa* by the broader obovate or oblong leaves with no visible peculiar reticulation and by its erect habit.

***Skimmia arisanensis* HAYATA sp. nov.** (Fig. 5-c). Frutex circ. 6 mm. altus ramosissimus. Rami erecti cinerascens glabri, cortice longitudinaliter elevato-rugoso, ramulis (hornotinis) glabris subnitidis fulvo-flavescentibus sub pulvino acuto-angulatis vel subulatis. Folia ad apicem ramulorum approximativim quasiverticillatim sita chartacea supra nitida viridia subtus pallidiora elongato-oblonga vel obovato-oblonga  $6\frac{1}{2}$ - $9\frac{1}{2}$  cm. longa  $2\frac{1}{2}$ - $3\frac{1}{2}$  cm. lata apice sur-

sum gradatim acuta versus apicem cuspidato-acuta ad summum late obtusa basi cuneata ad alas petioli abeuntia margine integerrima deorsum leviter recurva, pagina versus apicem subito deorsum recurva utraque pagine glabra, costa supra tenuissime acuto-elevata subtus plus prominente elevata, pagina folii supra deorsum medio impressa, partibus impressis sursum ad medium paginae folii evanescentibus deorsum ad sulcum petioli abeuntibus, costa supra secus partem impressam acuto-elevata, venis lateralibus primariis utraque pagine

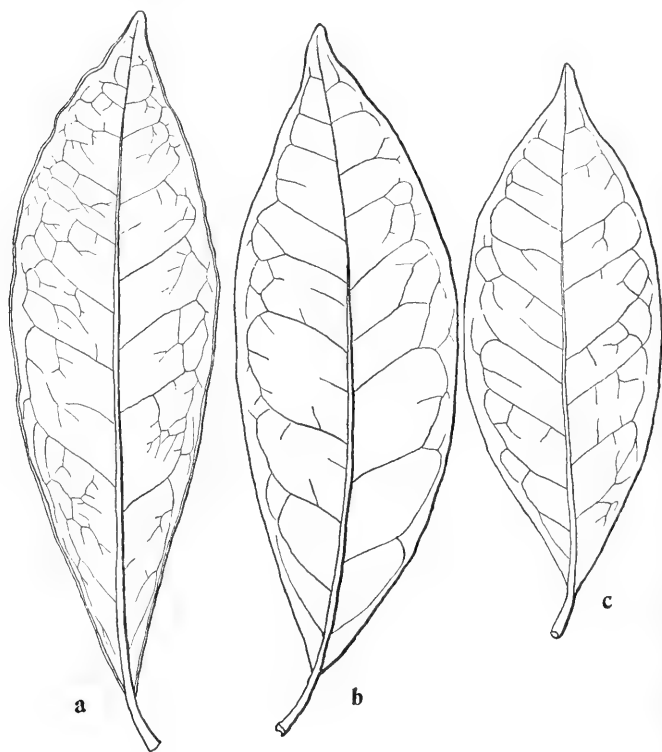


Fig. 5; a, *Skimmia distincte-venulosa* HAY.; b, *S. orthoceras* HAY.; c, *S. arisanensis* HAY.

tenuissime elevatis gracillimis utroque latere costæ vix visis 4-6, mediis a costa angulo 50° egressis rectis sursum furcatis cum ramis venarum superiorum junctis, venis secundariis fere obsoletis, costa basi subtus prominente angulata, angulis ad petiolum abeuntibus, petiolis glabris triquetris 5 mm. longis intus supra profunde sulcatis extus subtus prominente angulatis latere subalatis glabris. Panicula 4 cm. longa totiusque lata pyramidalis; rhachis puberula, profuse florifera; pedicellis ultimis puberulis circ. 1 cm. longis basi bracteis singulis medio bracteolis duabus instructis, bracteis triangularibus 1 mm. longis totiusque latis dorso carinatis intus planis margine ciliolatis, bracteolis subrotundatis  $\frac{2}{3}$  mm. longis totiusque latis glabris apice obtusissimis margine ciliolatis basi plus minus contractis, pedicellis sursum gradatim dilatatis ad calyces abeuntibus. Sepala 5 perfecte triangularia  $1\frac{1}{2}$  mm. longa latiora quam longa apice acuta basi latissima margine dense ciliolata cæterum glabra intus plana extus convexa. Petala 5 subalba ovato-oblonga vel oblonga 5-6 mm. longa 3 mm. lata apice rotundata vel obtusissima basi cuneata intus leviter concava extus convexa leviter patens vel suberecta margine integra basi cuneato-angusta ad basin extremitatem  $\frac{2}{3}$  mm. lata. Stamina 5, filamentis glabris validiusculis subteretibus  $3\frac{1}{2}$  mm. longis apice subulato-angustatis, antheris ovato-oblongis apice obtusissimis basi profunde 2-lobatis. Rudimentum ovarii late conicum 1 mm. longum  $1\frac{2}{3}$  mm. latum glabrum apice obtusum.

HAB. Arisan, ad 7000 ped. alt., leg. TAKEO ITÔ et B. HAYATA, Aprili. 1914.

**Skimmia orthoclada** HAYATA sp. nov. (Fig. 5-b). Frutex parvus erectus 1-2 m. altus pauci-ramosus, ramis ascendentibus, cortice fusco-cinerascenti glabro longitudinaliter rugoso ad rugos subalato, ramulis tetragonis virido-fulvescentibus ad pulvinos alato-angulatis. Folia ad basin et ad apicem ramulorum quasi-verticillatim sita, verticillis generaliter 3-foliatis, membranacea vel chartacea elongato-oblonga 11-14 cm. longa  $3\frac{1}{2}$ - $4\frac{1}{2}$  cm. lata apice acuminata ad summum obtusa basi cuneata ad petiolum abeuntia margine integra tenuissime deorsum recurva vel subplana utraque pagine glaberrima et ad costam glaberrima pagina supra ad costam impressa, partibus impressis a basi usque ad apicem folii attingentibus, costa supra secus partem impressam tenuissime elevata secus medium sulcata vel haud sulcata subtus prominente elevata dorso acuto-angulata vel haud angulata, pagina supra viridis subtus pallidissima, venis

lateralibus primariis utraque pagine tenuissime elevatis gracillimis vel haud elevatis vex vel haud visis utroque latere costæ 8-10, mediis a costa angulo 45°-50° egressis subrectis apice furcatis, venis secundariis sub luce transversa haud visis, reticulis venularum haud visis, petiolis 5-8 mm. longis glabris subtriquetris intus sulcatis extus subtus acuto-angulatis subalatis. Panicula fructifera terminalis 6 cm. longa totiusque lata. Bacca globosa 8 mm. longa rubra.

*Skimmia japonica* HAYATA Fl. Mont. Formos. p. 68, (non. THUNB.).

HAB. Mt. Arisan, leg. B. HAYATA et. S. SASAKI, Jan. 1912.

This species of *Skimmia* is generally found at a little lower altitudes in Mt. Arisan than the other two. The plant is more closely allied to the Japanese species than the other two are to the latter, but it is distinguishable from *S. japonica* THUNB. in having much thinner more acuminate leaves with the impressed costæ above.

### *Murraya* LINN.

***Murraya omphalocarpa*** HAYATA Ic. Pl. Formos. III. p. 51. Descriptio auctata: Floris pedicelli glabri 1½ cm. longi; flores apertientes campanulato-patentissimi 3½ cm. in diametro albi. Sepala 5 linearia 2½ mm. longa basi 1 mm. lata apice obtusissima glabra viridia integra dorso plus minus carinata. Petala 5 erecto-patentia oblanceolata vel obovato-oblonga 22 mm. longa 9 mm. lata apice obtusa vel obtuso-acuta basi cuneato-attenuata ad basin 1 mm. lata dorso extus medio tenuiter carinato-costata margine integra undulata intus plana haud costata. Stamina 8 (vel. 10?), filamentis plus quam 13 mm. longis glabris facie dorso complanatis 1 mm. latis utroque latere sulcatis apice angustissimis, antheris subrotundatis vel oblongis 1¼ mm. longis latisque apice emarginatis vel breve 2-lobatis inter lobos brevissime apiculatis basi 2-lobatis. Discus hypogynus pulvini-formis 1 mm. altus latusque glaber. Ovarium supra discum situm oblongum 2 mm. longum plus minus complanatum basi apiceque æquilatum haud contractum apice ad stylum validiusculum abeuns glabrum 2-loculare, loculis 1-2-ovulatis, ovulis pendulis anatropis, raphe ventrali; stylo glabro validiusculo columniformi 7-8 mm. longo ⅔ mm. in diametro apice stigmatoso.

HAB. In horto seminario Taihoku cult., leg. R. KANEHIRA, 1914. Mai.

## Ilicineæ.

*Ilex* LINN.***Ilex glomeratiflora* HAYATA**

(Fig. 6), Ic. Pl. Formos. III. p. 53.

HAB. Mt. Arisan, inter Funkiko et Taroyen, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914. Flowers light yellow.

## Celastrineæ.

***Euonymus* LINN.*****Euonymus euphlebiphylus* HAYATA sp. nov.**

Arborescens? ramuli læves pallidi virides glabri teretes. Folia subopposita vel alterna chartacea obovato-oblonga vel obovata 5–6½ cm. longa 2½–5 cm. lata apice obtusa vel emarginata basi obtusa cuneata vel latissime acuta margine remote serrulato-

crenulata, crenulis ascendentibus latere inferiore 1 cm. longis latere superiore ½ mm. longis obtusis, margine prope basin integra, costis venulis utraque pagine distincte elevatis elegante reticulatis, utraque pagine glaberrima in exsiccato pallidissima, venis lateralibus primariis utroque latere costæ 6–7 arcuatis, mediis basi a costa angulo 45° egressis venis sursum ramosis arcuato-recurvis, venulis reticulatis, petiolis 8 mm. longis supra intus late canaliculatis intra canaliculum 1-costulatis glabris. Cymæ terminales vel axillares ad axillas foliorum superiorum profuse dispositæ cum pedunculis 4 cm. longæ 3 cm. latæ (pedunculis 1–2 cm. longis) pallido-cinereo-glabræ dichotome vel trichotome 2–3-plo ramosæ, ramis basi bractea una instructis, bracteis minutis triangulari-cuspidatis ½ mm. longis basi latissimis 1 mm. latis apice cuspidatis margine denticulato-serrulatis prope marginem castaneo-coloratis, ramulis ultimis vel pedicellis ad medium

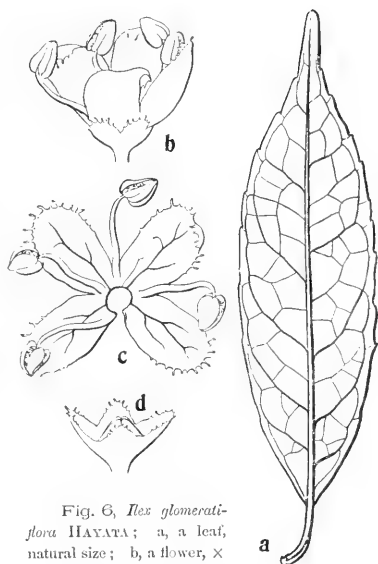


FIG. 6, *Ilex glomeratiflora* HAYATA; a, a leaf, natural size; b, a flower,  $\times 10$ ; c, corolla with stamens, expanded,  $\times 10$ ; d, calyx with rudimental ovary,  $\times 10$ .

bractea una instructis et ibi articulatis toto glabris, partibus supra articulationem sursum gradatim dilatatis ad calycem abeuntibus apice campanulato-dilatatis apice  $1\frac{1}{2}$ –2 mm. latis. Calycis tubus brevissimus; sepala (vel lobi calycis) glabra 5 latissime semirotundata  $\frac{3}{4}$  mm. longa  $1\frac{1}{3}$  mm. lata margine denticulato-serrulata apice late rotundata basi plus minus contracta. Petala oblongo-quadrangularia plus quam 2 mm. longa 1 mm. lata apice truncata basi truncata margine integra vel supra basin sursum sub microscopio minute denticulata a medio sursum exteriori recurva extus glabra intus medio deorsum glabra medio sursum sub microscopio minute lepidoto-punctata. Discus hypogynus basi lobi calycis situs lamellato-annuliformis 5-lobatus, lobis latissimis semi-rotundatis  $\frac{2}{3}$  mm. latis  $\frac{1}{3}$  mm. longis. Stamina 5 ad marginem disci inserta inter lobos disci sita, filamentis brevibus  $\frac{1}{4}$  mm. longis, antheris rubescentibus oblongis  $\frac{1}{3}$  mm. longis apice tenuissime basi modice lobatis. Ovarium glabrum depresso-globosum 1 mm. latum  $\frac{3}{4}$  mm. longum læve, stylo columniformi  $\frac{1}{2}$  mm. longo apice stigmatoso, stigmate 3-lobato, lobis brevissimis tenuissime 2-lobatis.

HAB. Kinsenspō? leg. FUJII, 1914.

**Euonymus pellucidifolius** HAYATA Ic. Pl. Formos. III. p. 57. Descriptio auctata. Pedicelli ultimi fructiferi 6 mm. longi apice dilatati. Sepala 4–5 persistentia semi-rotundata  $2\frac{1}{2}$  mm. lata  $1\frac{1}{2}$  mm. longa apice rotundata vel plus minus emarginata utraque glabra basi plus minus contracta margine minute denticulata, denticulis fusco-coloratis vel toto obsoletis. Fructus obconici 9 mm. longi cum alis 8 mm. lati apice truncati ad centrum valde impressi in sectione verticali apice cordati basi triangulari-cuneati ad basin  $2\frac{1}{2}$  mm. lati facie læves in exsiccato pallido-fulvescentes in sectione transversa pentagoni ad angulos alati, alis basi obscuris sursum prominentibus 1–2 mm. latis inæqualibus apice rotundatis, loculicide dehiscentes 5-loculares interdum 4- vel in abortu 2-loculares, loculis 1-spermis. Semina subovoidea  $4\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata apice obtusa basi rotundata nitida atro-rubescencia lævia ab apice usque ad basin reliquis funiculi adpresse notata basi arillis crassis obconicis flavis apice labulatis suffulta, arillis 3 mm. longis apice totiusque latis, interdum ad basin seminibus abortivis rubescentibus minutis appendiculatis; testa seminis haud crassa sed crustacea; albumen oleosum copiosum; embryo semper solitarius vel rarius geminus prope basin seminis situs ab apice seminis 1 mm.



distans; cotyledonibus oblongis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis apice rotundatis; radícula  $\frac{2}{3}$  mm. longa inferior.

HAB. Nantō, leg. T. KAWAKAMI.

**Euonymus arboricolus** HAYATA sp. nov. Frutex in specimine nostro ad truncum arboris crescens. Rami et ramuli subteretes vel subtetragoni, ramulis sublaevibus glabris. Folia ut videntur decidua vel persistentia? opposita chartacea vel membranacea ovata vel ovato-oblonga  $4\frac{1}{2}$ – $6\frac{1}{2}$  cm. longa  $2\frac{1}{3}$ – $3\frac{1}{2}$  cm. lata subito triangulari-acuta vel cuspidato-acuta basi obtusa vel versus basin rotundata ad extremitatem acuta margine minute crenulato-serrulata, serrulis ascendentibus 1 mm. latis  $\frac{1}{2}$  mm. longis, utraque pagine glaberrima, costa utraque pagine tenuissime elevata, venis utraque pagine tenuissime elevatis vel haud elevatis vix vel haud visis, venulis supra plus subtus minus visis interdum supra tenuissime elevatis subtus impressis vel generaliter subtus haud visis, venis lateralibus primariis utroque latere costae 5–6, mediis a costa angulo  $40^\circ$  egressis ad medium subrectis medio sursum recurvis cum eis superioribus junctis, arcolis inter venas laterales oblongis a margine 4 mm. distantibus, utraque pagine glaberrima, petiolis 5 mm. longis intus late canaliculatis vel alatis basi haud dilatatis. Flores cymosi, cymis patenti-ramosis pedunculatis solitariis axillaribus, pedunculis exceptis 1 cm. longis totiusque latis vel latioribus glabris, pedunculis  $1\frac{1}{2}$  cm. longis glabris gracillimis, bracteis triangularibus  $\frac{3}{4}$  mm. longis totiusque latis apice truncatis vel obtusissimis basi latissimis haud contractis margine setuloso-ciliolatis valde concavis, pedicellis 6 mm. longis glabris gracillimis apice gradatim ad calycem abeuntibus. Calyx latissime campanulatus vel subplanus 3 mm. in diametro glaber 1 mm. altus 4-lobatus, partibus haud lobatis cum disco ovarioque connatis, lobis late semirotundatis glabris 1 mm. longis  $1\frac{1}{2}$  mm. latis apice perfecte rotundatis basi latissimis utroque glabris margine sub lente minute denticulatis fusco-marginatis basi ad marginem vix vel haud imbricatis. Petala 4 tenuissime membranacea late rotundata latiora quam longiora 2 mm. longa apice subrotundata plus minus margine eroso-denticulata vel brevissime ciliolato-denticulata versus basin integra ad insertionem contracta ad basin  $\frac{1}{4}$  mm. lata concava extus glabra intus subglabra sed sub microscopio brevissime pubescentia. Stamina 8 ad marginem disci inserta, filamentis  $\frac{1}{2}$  mm. longis complanato-subulatis glabris,

antheris late cordato-reniformibus  $\frac{4}{5}$  mm. latis  $\frac{2}{3}$  mm. longis apice vix vel haud emarginatis basi profunde 2-lobatis, lobis (loculis) firme contactis, partibus apicalibus connatis. Discus annularis. Ovarium semi-inferius sed ad apicem liberum, partibus liberis complanato-conicis facie sub lente tenuiter vel dense breve echinatis, apice subito ad stylum abeuns, stylo glabro circ. 1 mm. longo columniformi basi coniciformi  $\frac{4}{5}$  mm. longo plus minus sulcato haud perfecte tereti apici stigmatifero.

HAB. Mt. Arisan, inter Suisharyo et Funkiko, Aprili. 1914, leg. R. KANEHIRA, I. TANAKA et B. HAYATA.

Near *E. Spraguei* HAY., but distinguishable from it by the ovate broader leaves.

**Euonymus Spraguei** HAYATA (Fig. 7). Ic. Pl. Formos. I. p. 137, t. 20. Descriptio auctata: Folia speciminis floriferi minora et tenuiora quam iis speciminis fructiferi oblonga chartacea vel chartaceo-membranacea; stipulis caducissimis triangularibus  $\frac{1}{2}$  mm. longis totiusque latis fimbriatis. Gemma conica apice acuta, perulis triangularibus margine ciliato-serrulatis. Cymæ versus apicem ramuli ad axillas foliorum oppositim sitæ solitariae glabrae pedunculatae, pedunculis glabris complanatis  $1\frac{1}{2}$  cm. longis simplicibus apice cymigeris, cymis ipsis (pedunculis exceptis) 2 cm. longis totiusque latis multifloratis, bracteis subtriangularibus minus quam 1 mm. longis totiusque latis apice obtusis vel obtusissimis margine subintegris vel minute serrulato-ciliolatis, pedicellis  $5\frac{1}{2}$  mm. longis glabris apice dilatatis ad cupulam calycis abeuntibus. Calycis cupula subplana vel plus minus deorsum concava 2 mm. in diametro, lobis 4 semicircundatis  $1\frac{1}{3}$  mm. latis  $\frac{2}{3}$  mm. longis glabris margine castaneo-coloratis crosso-ciliolatis vel haud ciliolatis in flore apertienti deorsum reflexis sed semper sursum concavis. Petala in flore apertienti rotundata 3 mm. longa basi brevissime unguiculata, partibus unguiculatis minus  $\frac{1}{2}$  mm. longis 1 mm. latis, lamina rotundata  $2\frac{1}{2}$  mm. in diametro margine crosso-ciliolata glabra. Stamina 4, filamentis glabris  $1\frac{1}{2}$  mm. longis complanatis glabris basi  $\frac{1}{4}$  mm. latis sursum gradatim angustioribus, antheris triangulari-cordatis minus  $\frac{1}{2}$  mm. longis totiusque latis apice triangulari-acutis ad summum apiculatis basi cordatis usque ad  $\frac{1}{2}$  lobatis (lobis apice rotundatis) dorso perfecte planis facie convexis glabris. Discus latiusculus glaber planus. Ovarium semisuperius, partibus

liberis conicis  $1\frac{1}{2}$  mm. latis  $\frac{2}{3}$  mm. longis densissime echinato-setulosis (setulis  $\frac{1}{3}$  mm. longis obtusis) apice ad basin styli abeuntibus, stylo columniformi  $1\frac{1}{3}$  mm. longo glabro apice glabro stigmatifero, ovarium 4-loculare, loculis 2-ovulatis.

HAB. Mt. Arisan : prope Taroyen, leg. I. TANAKA, R. KANEHIRA et B. HAYATA, April. 1914 (Fl.).

**Euonymus Tanakæ**  
MAXIM.; MATSUM. et HAYATA  
Enum. Pl. Formos. p. 83.  
Frutex, rami et ramuli fusco-  
cinerascentes, cortice rugosis-  
simo cicatricibus foliorum  
elevatis transverse semi-rotun-  
datis notato. Folia versus  
apicem densissime alternatim  
disposita vel subverticillata

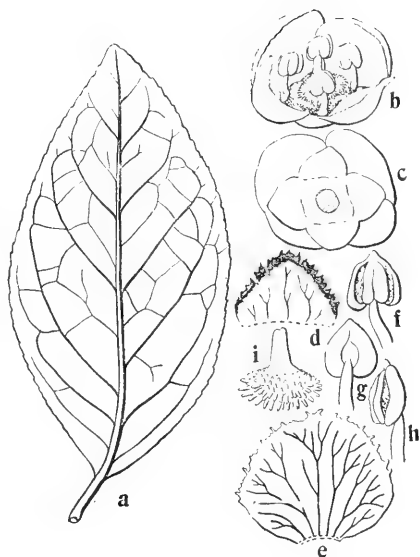


Fig. 7, *Euonymus Spraguei* HAYATA; a, a leaf, natural size; b, a flower,  $\times 4$ ; c, the same, seen from back  $\times 4$ ; d, a sepal; e, a petal; f, g, h, stamens; i, ovary; figures are drawn from hardly opened flowers; petals and filaments are a little shorter here than those given in the description.

chartacea in exsiccatō fulvo-viridia obovata obovato-oblonga  $5\frac{1}{2}$ –7 cm. longa  $2\frac{1}{2}$ –4 cm. lata apice triangulari-obtusissima vel brevis cuspidato-obtusissima basi cuneata margine crenulato-serrulata, serrulis 2 mm. latis  $\frac{1}{2}$  mm. longis subrotundatis, versus basin integra utraque pagina glaberrima, costis venisque utraque pagina tenuissime elevatis distinctis, venulis vix vel haud visis tenuissimis, venis lateralibus primariis utroque latere costæ 7, mediis a costa angulo  $45^\circ$  egressis subarcuatis, sursum ramosis prope marginem evanescentibus, venulis tenuissime reticulatis, reticulis haud impressis haud elevatis vix visis, supra virido-fuscentia subtus pallida, petiolis 8 mm. longis intus canaliculatis vel angustissime alatis. Cymæ versus apicem ramorum quasiterminaliter cespito-

sinque sitæ sed in sensu vero ad axillas foliorum versus apicem rami approximativè dispositorum solitariae glabrae, pedunculis 3-5 cm. longis complanatis, cymis ipsis subumbelliformibus 3-8-radiatis simplicibus  $1\frac{1}{2}$  cm. longis (pedunculis exceptis) totiusque latis, radiis vel pedicellis  $1\frac{1}{2}$  cm. longis glabris, bracteis caducissimis ignotis. Calycis cupula subplana vel leviter deorsum recurva extus glabra 5 mm. in diametro, lobis 4 brevissimis latissimis late crescentiformibus 1 mm. longis 4 mm. latis apice perfecte latissime rotundatis plus minus deorsum reflexis sed supra sursum concavis dorso convexis glabris ad marginem mucronibus nigro-coloratis remote instructis versus basin imbricatis crassiusculis. Petala 4 late rotundata 6 mm. longa 7 mm. lata latiora quam longiora margine crosa exteriorè recurva intus convexa extus concava (in flore apertiente) utraque pagine glabra multinervia basi ad insertionem 2 mm. lata. Stamina 4 per discum planum exserta, filamentis glabris  $1\frac{1}{2}$  mm. longis complanatis  $\frac{1}{2}$  mm. latis validiusculis per totam longitudinem æquilatis, antheris subbasifixis late obreniformibus  $1\frac{1}{3}$  mm. latis  $\frac{2}{3}$  mm. longis, loculis superioribus, connectivis inferioribus latiusculis; areolis sub stamine late oblongis 2 mm. longis a ovario circ. 1 mm. a margine disci circ.  $\frac{1}{4}$  mm. distantibus elevatis plus minus rugulosis (in exsiccato); disci ampli 6 mm. in diametro plus minus convexi margine leviter 4-lobati, lobis latissimis rotundatis. Ovarium semi-superius apice per discum penetrato-exsertum, partibus exsertis liberis tetragono-conicis 1 mm. altis apice acutis stylo brevissimo  $\frac{1}{2}$  mm. longo apiculatis in sectione tetragonis ad angulos angustissime alatis, facie inter angulos subconcava glabra levi, 4-loculare, loculis 4-ovulatis.

HAB. Kelung, leg. S. SASAKI, Aprili. 1911.

This is merely a form of *Euonymus Tanakæ* MAXIM. with emarginate leaves due to some injurious causes. The normal form of a leaf is cuneately obovate with a short cuspidate tip.

### *Celastrus* LINN.

**Celastrus Kusanoi** HAYATA (Fig. 8), Mater. Fl. Formos. p. 60. Descriptio auctata:—Frutex scanlentissimus ad truncum arboris a basi usque ad summum scandens, cortice levi haud ruguloso fuscopurpurascenti lenticellato, (lenticellis minutis longitudinaliter oblongis 1 mm. longis  $\frac{1}{2}$  mm. latis), subglabratus vel minute hirsutus, ramulis hortoniiis fulvo-villoso-hirsutis haud lenti-

cellatis. Folia ut videntur decidua membranacea oblongo-rotundata vel rotundata 5-7 $\frac{1}{3}$  cm. longa 38-50 mm. lata apice cuspidato-acuta ad summum obtusissima ad centrum summorum breve aristata, aristis 1 mm. longis, basi truncato-rotundata margine minute tenuissime serrata, serris a se (ab apice serræ usque ad apicem alius proximæ) 5 mm. distantibus ascendentibus brevissimis apice breve aristatis, (aristis interdum obsoletis), basi subintegra utraque pagine glabra, costa cum venis venulisque supra plana haud impressa haud elevata subtus tenuissime elevata sed distincte visa gracillima, venulis inter venas laterales rectangulariter transversis tenuissimis, venis primariis lateralibus

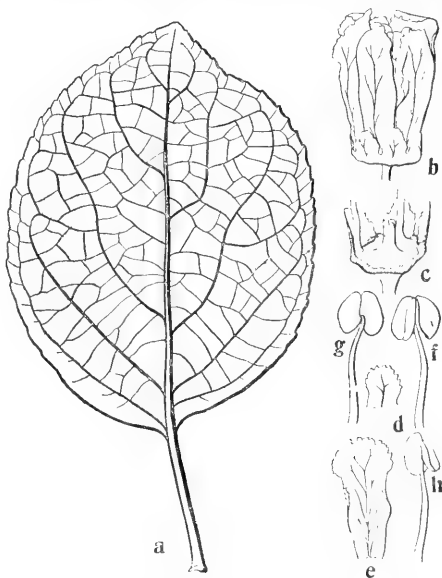


Fig. 8, *Celastus Kusanoi* HAYATA; a, a leaf, natural size; b, a flower,  $\times 6$ ; c, the same in section, petals taken off; d, a sepal,  $\times 6$ ; e, a petal,  $\times 6$ ; f, g, h, stamens  $\times 6$ .

utroque latere costæ 5-7, basilaribus a costa angulo circ. 90° egressis, mediis angulo 50° egressis subrectis vel plus minus arcuatis haud flexuosis sursum arcuatis, petiolis circ. 20 cm. longis gracillimis subglabris vel adpresse tenuissime hirsutis intus sulcatis. Flores virides cymosi, cymis paniculatis, paniculis axillaribus vel terminalibus; rhachis panicularum fulvo-hirsuta, pilis brevissimis  $\frac{1}{10}$  mm. longis; bracteis caducissimis; pedunculis cymarum circ. 1 cm. longis hirsutis rectis a rhachibus panicularum valde divaricatis, pedicellis 2 mm. longis basi cum pedunculo articulatis apice cum calyce connectis. Calyx extus brevissime hirsutus late campanulatus 2 $\frac{1}{2}$  mm. longus 4 mm. latus 5-lobatus, lobis

triangulārī-quadrangulārībūs  $1\frac{2}{3}$  mm. longis basi latissimis  $1\frac{1}{2}$  mm. latis apice truncatis (partibus truncatis 1 mm. latis) margine obscure denticulatis intus glabris deorsum fusco-maculato-punctatis. Petala cuneato-obovata minus 4 mm. longa  $1\frac{1}{2}$  mm. lata apice truncata vel rotundata basi cuneata ad insertionem  $\frac{1}{4}$  mm. lata margine eroso-denticulata extus glabra intus deorsum minute hirsuta ad apicem limbi calycis inserta. Stamina ad apicem limbi calycis vel ad basin lobi calycis inserta, filamentis valde complanatis  $3\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis deorsum minute hirsutis versus apicem plus minus angustioribus, antheris subcordatis minus quam 1 mm. longis totiusque latis glabris apice minute apiculatis vel haud apiculatis extrorsis vel (rarissime) introrsis. Discus tenuissimus. Ovarium minutum conicum  $\frac{1}{4}$  mm. longum apice ad stylum  $\frac{1}{3}$  mm. longum abeunns, stylo breve columniformi glabro  $\frac{1}{3}$  mm. longo apice truncato stigmatoso.

HAB. Mt. Arisan: inter Heishana et Jūjīro, leg. B. HAYATA, Aprili. 1914.

The above description is drawn up from a flowering specimen, while the original one is from a fruit-bearing specimen.

**Celastrus leiocarpus** HAYATA sp. nov. Frutex. Rami graciles cinereo-rubescētes subrugulosi lenticellati, lenticellis minutis elevatis cinerascētibūs. Folia oblonga oblongo-ovata 4–4½ cm. longa 2–2½ cm. lata apice acuta ad summum acuta vel obtusa basi obtusa vel brevis acuta margine brevis serrulata versus basin integra coriacea utraque pagine glabra, costa supra tenuissime elevata subtus prominente elevata, venis venulis supra reticulatis manifeste impressis, subtus venis tenuissime elevatis venulis subtus haud vel vix elevatis, reticulis venularum haud visis, petiolis 6–8 mm. longis glabris supra (intus) canaliculatis. Flores ignoti. Fructus cymoso-racemosim dispositi, racemis 12 cm. longis cum fructu  $2\frac{1}{2}$  cm. latis a ramulo angulo recto divaricatis, pedicellis 3–4–congestis 1 cm. longis; calycis lobis persistentibus triangularibus apice obtusis margine erosis 1 mm. longis; fructus facie flavescentes laeves 3-valvatim dehiscētes, valvis (carpellis) ovato-oblongis basi obtusis apice acutis cum stylo apiculatis dorso convexis ventrali valde concavis medio intus costatis, (costis plus minus sulcatis), crustaceis intus flavescentibus. Semina in fructu singulo 6 arillis membranaceis toto oblecta rubescētia oblonga  $2\frac{1}{2}$  mm. longa minus quam 2 mm. lata laevia vel minute densissime longitudinaliter punctata. Albumen copiosum; embryo amplius.

HAB. Taitō: Iryokukaku, leg. U. MORI, 1906 (No. 2198).

Very near *C. gracillimus* HAYATA, but distinguishable from it in having much thicker leaves with impressed veins on the upper surface.

**Celastrus longe-racemosus** HAYATA sp. nov. (Tab. III.) Frutex ad truncos arboris a basi usque ad summum scandens, ramis ramulisque gracilibus glaberrimis, cortice in exsiccatō fusco-purpurascenti plus minus lenticellato, enticellis prominente elevatis, vel haud lenticellato. Folia ut videntur decidua chartacea in specimine variegato-cinerascentia subnitida oblongo-oblanccolata vel obovato-lanceolata 48 mm.—58 mm. longa 17 mm. lata apice cuspidato-acuta vel abrupte acuta ad summum acuta haud aristata basi obtusa vel cuneata margine (apicibus et partibus basilaribus cuneatis exceptis) crenato-serrulata, serrulis ascendentibus, costa supra tenuissime elevata gracillima subtus plus prominente elevata, venis venulis utraque pagine elevatis, reticulis venularum utraque pagine distincte elevatis, venis lateralibus primariis utroque latere 5-6, inferioribus a costa angulo 30° egressis, superioribus angulo 40° egressis utraque pagine elevatis, petiolis 3 mm. longis glabris. Flores albi vel virido-albi longe paniculati, paniculis supra cicatrices foliorum deciduorum sitis vel terminalibus vel e basi ramorum oriundis basi multo perulatis (perulis triangularibus squamiformibus siccis castaneis) longissimis descendentibus vel pendulis 10-25 cm. longis cum flore 2 cm. latis, ramis panicularum brevibus circ. 1 cm. longis, floribus ad apicem rami cymose dispositis, rhachibus et ramis glabris subtetragonis, pedicellis ultimis viridibus circ. 3 mm. longis glabris ad medium articulatis, basi bracteis singulis et bracteis duabus instructis, bracteis 1½ mm. longis triangulari-linearibus ½ mm. latis margine crosso-ciliolatis acuminatis, bracteolis oblongis minutis ½ mm. longis ciliolatis. Calyx late campanulatus viridis 1½ mm. altus 4 mm. in diametro 5-lobatus, lobis late rotundatis 1 mm. longis 2 mm. latis denticulato-ciliolatis intus concavis extus convexis glabris. Petala 5 pallido-albo-viridia lineari-oblonga 2½ mm. longa 1½ mm. lata apice obtusa basi sub-requilata ad insertionem 1 mm. lata margine irregulariter crosso-denticulata in flore apertienti exteriorē reflexa deorsum recurva. Discus membranaceus cupuliformis cum tubo calycis toto connatus margine liber erectus, partibus erectis ½ mm. altis margine inter stamina dente uno instructis, glaber. Stamina 5 ut videntur ex apice marginis disci oriunda, fila-

mentis 1 mm. longis glabris complanatis apice teretibus angustioribus, antheris oblongo-cordatis  $\frac{2}{3}$  mm. longis totiusque latis glabris basi cordatis apice obtusis haud truncatis haud apiculatis vel tenuissime emarginatis. Ovarium fere superius glabrum  $\frac{1}{4}$  mm. longum  $\frac{2}{3}$  mm. latum subconicum apice ad stylum abeuns; stylo brevissimo  $\frac{2}{3}$  mm. longo columniformi apice truncato, 3-loculare?, loculis 2-ovulatis?

HAB. Mt. Arisan: inter Karapin et Suisharyō, leg. B. HAYATA et I. TANAKA.  
Remarkable for its very long racemes.

**Celastrus gracillimus** HAYATA sp. nov. Frutex scandentissimus a basi trunci arboris usque ad summum ascendens, ramulis subrectis teretibus cinerascens glabris longitudinaliter striato-rugosis versus strias fissis lenticellatis, lenticellis elevatis longitudinaliter fusiformi-oblongis minus quam 1 mm. longis minus quam  $\frac{1}{2}$  mm. latis fulvescentibus, ramulis floriferis fusco-rubrescentibus, ultimis haud lenticellatis. Folia ut videntur decidua membranacea vel membranaceo-chartacea obovata vel oblonga  $5\frac{1}{2}$  cm. longa 3 cm. lata apice breve caudato-acuta ad summum acuta basi triangulari-acuta vel rotundato-acuta sed ad basin semper acuta, venis venulis in exsiccatō utraque pagine distincte elevatis, costa supra minus subtus plus elevata, reticulis venularum supra plus subtus minus elevatis, margine (acuminibus partibus basilaribusque exceptis) serrulata, serrulis ascendentibus a se 2 mm. remotis, acumine basique integro, venis lateralibus primariis utroque latere 5-6, mediis a costa angulo 50° egressis, pagina utraque glabra subtus pallida, petiolis 1 cm. longis intus sulcatis glabris, stipulis caducissimis filiformibus 1 mm. longis simplicibus vel interdum 2-3-fimbriatis. Cymæ breves 1 cm. longæ pedunculatæ ad axillas foliorum superiorum solitariae, pedicellis gracillimis basi bracteatis, bracteis minutis linearibus  $\frac{1}{4}$  mm. longis, pedicellis glabris ultimis 3 mm.-4 mm. longis, supra medium articulatis. Flores virides; petala viridia albo-marginata. Calyx late campanulatus 1 mm. altus 5-lobatus, lobis oblongis minus quam 1 mm. longis  $\frac{2}{3}$  mm. latis apice obtusissimis vel rotundatis margine minute glanduloso-denticulatis glabris. Petala 5 obovato-oblonga plus quam 3 mm. longa  $1\frac{1}{2}$  mm. lata apice obtusissima basi subcuneata margine sursum crosso-denticulata. Discus tenuissimus cum limbo calycis toto connatus margine 5-lobatus, lobis liberis  $\frac{1}{5}$  mm. altis  $\frac{1}{2}$  mm. latis cum stamine alternis tenuissimis mem-



branaceis. Stamina 5 cum lobis disci alterna, filamentis complanatis  $2\frac{1}{2}$  mm. longis basi cum disco connatis apice angustioribus glabris, antheris late cordatis 1 mm. latis minus quam 1 mm. longis latioribus quam longis apice emarginatis basi lobatis glabris. Ovarium inferius, stylo columnari 1 mm. longo glabro apice 3-fido, ramis  $\frac{1}{3}$  mm. longis apice triangularibus acutis stigmatosis.

HAB. Mt. Arisan: inter Jūjō et Heishana, leg. B. HAYATA, Aprili. 1914.

Fruits of this species are not yet observed. I found a few fruit-like bladders caused by an insect in the ovaries, which bladders may have been mistaken for fruits. The following is the description of the same bladder which was at first taken for a fruit.

Galla ovarii globosa 6-7 mm. in diametro succulenta apice rotundata cum lobis calycis persistentibus adpressis coronata basi rotundata sed ad extremitatem brevissime apiculato-attenuata laevis in exsiccatō fulvescens glabra.

Very near *C. leiocarpus* HAY., but differs from it by the much thinner leaves with elevated veins on the upper surface.

**Celastrus geminiflorus** HAYATA sp. nov. (Fig. 9) Frutex scandentissimus fusco-purpurascens longitudinaliter rugulosus lenticellatus, lenticellis minutis elevatis rotundatis medio fissis  $\frac{2}{3}$  mm. longis. Folia ut videntur decidua membranacea oblonga vel obovato-oblonga  $4\frac{1}{2}$  cm. longa 27 mm. lata apice abrupte acuta ad summum acuta basi triangulari-acuta vel acuta margine (partibus basilaribus exceptis) brevissime serrulata, serrulis mediis a se 3 mm. remotis, inferioribus a se 6 mm. remotis ascendentibus, costa supra plana haud impressa vix elevata, venis primariis lateralibus gracillimis utraque pagine tenuissimis plus minus elevatis utroque latere costae 3-4 a costa angulo  $45^\circ$  egressis subrectis sursum arcuatis, utraque pagine glaberrima subtus pallida, petiolis 4-5 mm. longis glabris intus canaliculatis, stipulis filiformibus crispatis  $1\frac{1}{2}$  mm. longis a basi 2-3-fimbriatis vel simplicibus. Flores ♂ ad axillas foliorum solitarii vel gemini sub folio penduli vel descendenter siti graciliter pedicellati, pedicellis pendulis 3 mm. longis glabris medio articulatis. Calyx obconicus

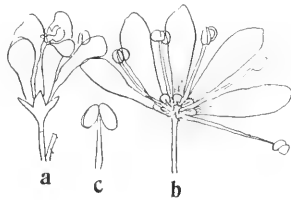


FIG. 9, *Celastrus geminiflora* HAYATA; a, a male flower; b, the same, expanded; c, a stamen.

2 mm. longus  $2\frac{1}{2}$  mm. latus ad medium longitudinis 5-lobatus, lobis oblongo-quadrangularibus  $1\frac{1}{4}$  mm. longis basi 1 mm. latis apice obtusissimis truncatis apice et latere minute serrulato-denticulatis glabris. Petala 5 obovato-lineariter 5 mm. longa  $1\frac{1}{2}$  mm. lata apice truncata vel obtusissima deorsum cuneato-angustata ad insertionem  $\frac{2}{3}$  mm. lata 1-nervia margine medio sursum minute denticulata medio deorsum subintegra suberecta vel extrorsum tenuissime recurva. Stamina 5 haud exserta quam petalis breviora  $3\frac{1}{2}$  mm. longa, filamentis glabris tereto-complanatis 3 mm. longis apice attenuatis, antheris late cordatis  $\frac{2}{3}$  mm. longis latioribus quam longioribus apice emarginatis basi 2-lobatis glabris. Discus 5-lobatus, lobis dorso complanatis  $\frac{2}{3}$  mm. longis  $\frac{1}{3}$  mm. latis apice truncatis in exsiccatu rubescentibus glabris. Ovarium fere reductum, stylo columnari  $\frac{2}{3}$  mm. longo.

HAB. Fokien: Mt. Useki, leg. S. NAGASAWA, Dec. 1910.

*Perrottetia* H. B. et K.

Cassinioideæ—Perrottetieæ ENGLER u. PRANTL Nat. Pfl.-fam. III-5, p. 220; BENTH. et HOOKER Gen. Pl. I. pp. 367 et 998; LÆSNER, in ENGL. Bot. Jahrb. XXIV. p. 199 sub *Ilex racemosa* OLIV. (in HOOK. Ic. Pl. t. 1863).

DISTRIB. Mexico, Columbia, Sandwich, Australia, Molukka, Java, Sumatra, Borneo, Philippines; China: Hupeh.

***Perrottetia arisanensis*** HAYATA sp. nov. (Tab. IV.) Arborescens vel frutescens. Rami defoliati graciles flexuosi ramulos foliatis alternatim gerentes, cortice glabro fusco-cinerascenti haud lenticellato hac atque illac nigricanti, teretes. Ramuli subrecti alternatim foliati sursum hirsuti teretes in exsiccatu fuscentes. Folia alterna membranacea in exsiccatu ovato-oblonga vel elongato-oblonga 5-9 cm. longa 2-4 cm. lata apice caudato-acuminata, acuminibus apice plus minus falcato-recurvis vel haud recurvis ad summum aristatis, basi rotundato-obtusata obtusa vel rotundata margine argute serrulata, serrulis mediis a se (ab apice serrulae usque ad apicem alius proximæ)  $2\frac{1}{2}$  mm. distantibus brevibus apice aristis vel mucronibus  $\frac{2}{3}$  mm. longis instructis, latere superiore serrularum subnullo, latere inferiore  $2\frac{1}{2}$  mm. longo, pagine in exsiccatu supra fuscentia glabra subglabrata, costa supra plus minus angustissime elevata subtus tenui late elevata, venis lateralibus supra tenuissime elevatis subtus plus elevatis, reticulis

venularum utraque pagine tenuissime impressis supra vix subtus distincte visis, pagine subtus ad axillas inter costam et venas laterales fasciculis pilorum alborum instructa, venis lateralibus primariis utroque latere costae 8-9, mediis a costa angulo 30°-40° egressis arcuatis prope marginem ramulosis ad venulam abeuntibus, petiolis fuscentibus 5 mm. longis hirsutis vel glabris intus profunde sulcatis, stipulis minutis ovato-triangularibus 1 mm. longis  $\frac{1}{2}$  mm. latis obtusis intus glabris extus hirsutis ciliolatis caducissimis. Flores minuti monœcii cymose dispositi; cymis ad axillas foliorum superiorum solitariis vel terminalibus 2-3 cm. longis totiusque latis, ramis flexuosis gracilibus, rhachibus ramis ramulisque glabris vel hirsutis, bracteis minutis oblongis  $\frac{1}{2}$  mm. longis longe ciliatis. Fl. ♂: pedicellis 3-4 mm. longis ad medium vel prope apicem articulatis; calyx subplanus glaber, cupula  $1\frac{1}{2}$  mm. in diametro. Sepala 4 linearia glabra recta subpatentia  $1\frac{1}{2}$  mm. longa  $\frac{1}{2}$ - $\frac{1}{3}$  mm. lata apice obtuso-acuta 1-nervia basi plus minus dilatata margine haud vel vix ciliolata persistentia. Petala cum sepalis conformia exacte e margine cupulae calycis inter sepala oriundi (sinibus inter sepala et petala obtusissimis) 1-nervia linearia  $1\frac{1}{2}$  mm. longa  $\frac{1}{2}$ - $\frac{1}{3}$  mm. lata recta patentia margine vix interiore recurva margine integra apice acuta haud vel vix ciliolata basi vix dilatata. Stamina 4 cum petalis alterna ad marginem disci inserta, filamentis  $\frac{1}{2}$ -1 mm. longis glabris, antheris dorsifixis rotundatis utrinque emarginatis  $\frac{2}{3}$  mm. in diametro versatilibus. Discus complanatus ad totam faciem cupulae calycis expansus tenuis. Rudimentum ovarii minutum in disco semi-immersum ovoideum  $\frac{1}{3}$ - $\frac{1}{2}$  mm. longum glabrum, stylo  $\frac{1}{3}$  mm. longo apice 2-fido. Fl. ♀. minores quam floribus masculinis. Sepala et petala conformia in alabastro haud vel vix imbricata in flore apertienti patentia deorsum  $\pm$  recurva linearia 1 mm. longa basi latiora  $\frac{1}{3}$  mm. lata apice acuta vel acuminata margine integra utraque pagine glabra. Staminodia 4 sepalis opposita ad marginem disci inserta brevissima oblonga dorso complanata  $\frac{1}{3}$  mm. longa  $\frac{1}{2}$  mm. lata apice obtusissima. Discus ad faciem cupulae calycis expansus. Ovarium superius globosum plus quam  $\frac{1}{2}$  mm. in diametro glabrum 2-loculare, loculis 2-ovulatis, ovulis colateralibus erectis amphitropis, raphe ventrali. Fructus in exsiccato fuscentes depresso-globosi tenuiter 4-lobati  $1\frac{2}{3}$  mm. lati  $1\frac{1}{2}$  mm. longi apice truncati vel plus minus depressi baccati haud succulenti sed sicci apice stylo persistenti coronati basi sepalis

petalisque persistentibus suffulti. Semina in fructu singulo 4 globosa plus minus complanata  $1\frac{1}{4}$  mm. longa totiusque lata arillis membranaceis toto oblecta, testa crustacea minute reticulato-rugosa fuscenti; albumen copiosum; embryo ignotus.

HAB. Mt. Arisan, inter Karapin et Suisharyō, leg. I. TANAKA, R. KANEHIRA et B. HAYATA, Aprili. 1914.

Near *Perrottetia alpestris* var. *philippinensis*. The new species just described is one of the plants which I found extremely difficult as to its proper family. As the petals and sepals are very similar and arranged nearly in a single whirle, it was very difficult task to determine the relative position of the floral elements. The structure of the ovary and ovules was also very hard to be stated exactly. I have made all these difficult characters clear, by studying the commencement of the flower-development. The distribution of this genus is very interesting. According to Th. LÆSENER (in ENGL. Bot. Jahrb. XXIV. p. 200), there exist eleven species in all; two in Mexico, two in Columbia, one in Hawai, one in Australia, one in Molukka, one in Java, Sumatra and Borneo, one in the Philippines, one in China, and the last, the present one, in Formosa. The Chinese plant is illustrated under the name of *Ilex racemosa* OLIVER in HOOK. Ic. Pl. t. 1863. Our plant exactly accords with the description given by LÆSENER in ENGL. et PRANTL. Nat. Pfl.-fam., but less exactly with that of the Genera Plantarum, as far as the generic characters of this plant are concerned.

## Rhamneæ.

### *Alphitonia* REISSEK.

***Alphitonia excelsa*** REISSEK, ex ENDL. Gen. Pl. p. 1098.

HAB. Hainan: leg. S. KONISHI.

Named by Mr. E. D. MERRILL.

### *Sageretia* BRONGN.

***Sageretia hamosa*** BRONGN.: HOOK. f. Fl. Brit. Ind. I. p. 641; HEMSL. Ind. Fl. Sin. I. p. 131.

The species is recorded from Formosa. But, the occurrence of this species is very doubtful; so far, we have never seen the plant in the island.

**Sageretia randaiensis** HAYATA, sp. nov. (Fig 10). Ramuli graciles fusco-pubescentes glabri. Folia subalterna in exsiccatto chartacea in exsiccatto fulvo-rubescens oblonga vel oblongo-ovata 10–13 cm. longa  $4\frac{1}{2}$ –6 cm. lata apice cuspidato-acuta ad apicem cuspidis obtusa ad summum breve apiculata basi rotunda margine minutissime vel tenuissime serrulata, serrulis a se (ab apice serrularumque ad apicem altrarum) 2 mm. distantibus, supra glaberrima subtus glabra ad castas plus minus pubescentia demum glabrata, costa supra impressa subtus prominente elevata, venis lateralibus primariis supra tenuiter impressis subtus prominente elevatis utroque latere costæ 8–9, inferioribus alternis, superioribus oppositis, mediis a costa angulo  $45^\circ$  egressis a basi sursum apice gradatim arcuatis versus apicem subito arcuatis prope marginem evanescentibus, venulis inter venas laterales oblique transversis utraque pagine elevatis, reticulis venularum utraque pagine elevatis distincte visis, petiolis 1 cm. longis glabris subteretibus latere complanatis intus profunde sulcatis. Flores sessiles glomerato-spicati, spicis terminalibus simplicibus vel paucè ramosis in specimen nostro  $2\frac{1}{2}$  cm. longis, glomeris 2–4-floratis approximativè spicativè dispositis rhachis spicarum fulvo-villosa; sub flore singulo bracteis unis bracteolis duabus sitis, bracteis ovato-triangularibus acutis 1 mm. longis dorso triangulari-carinatis paucissime pubescentibus vel subglabris intus concavis extus convexis margine præsertim basi ciliolatis, bracteolis oblongis acutis 1 mm. longis basi margineque ciliolatis glabris dorso convexis intus concavis. Alabastrum florum depresso-globosum apice breve cuspidato-acutum basi rotundatum vel truncatum. Flores apertientes cum sepalis valvatis erectis  $2\frac{1}{4}$  mm. in diametro toto glabri sed ad basin hirsuti. Sepala 5 valvata triangulari-cuspidata  $1\frac{1}{2}$  mm. longa 1 mm. lata apice cuspidato-acuta vel acuta basi latissima crassiuscula toto glabra extus plana intus leviter concava vel subplana medio 1-costata, costa prominente, margine elevato-carinata. Petala 5 minuta  $\frac{2}{3}$  mm. longa stamina involventia secus longitudine plicata explicato rotundata basi acuta apice rotundata margine hyalina. Stamina 5 petalis opposita 1 mm. longa

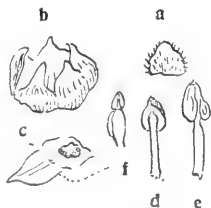


Fig. 10, *Sageretia randaiensis* HAYATA; a, a bract; b, a flower; c, a portion of the same, sepals expanded; d, e, stamens, seen from different sides; f, a petal with a stamen.

petalis longiora, filamentis validiusculis  $\frac{3}{4}$  mm. longis glabris complanatis linearibus glabris, antheris ovato-oblongis apice apiculatis  $\frac{1}{4}$  mm. longis. Cupula calycis pentagona subplana vel leviter concava 2 mm. in diametro; discus planus toto facie cupulae extensus. Ovarium ovoideo-conicum apice obtusissimum  $\frac{3}{4}$  mm. longum glabrum extus tenuissime multi-sulcatum apice stigmatosum, stylo nullo; ovarium 2-loculare, ovulis in loculis solitariis erectis anatrois, raphe dorsali. Fructus non visus.

HAB. Mt. Randaisan, leg. B. HAYATA et U. MORI, Aug. 1908, (No. 7008).

In respect of the leaves, this new species is very near *Sageretia hamosa* BRONGN. It is very likely that the new species is the same as the plant which is recorded from Formosa as *Sageretia hamosa* BRONGN. (HEMSL. Ind. Fl. Sin. I. p. 131). I have never seen the type of the latter species. The only description which is accessible to me is one given in Hook. f. Fl. Brit. Ind. I. p. 641. It is, however, something like gambling to identify the plant in question with a species by means of so short a description as that quoted bellow. "Leaves 4-5 by 2 in. elliptic-oblong shortly acuminate serrate glabrous on both surfaces. A large shrub, with long straggling glabrous branches, unarmed or with very stout short deflexed spines. Flowers puberulous, in terminal and axillary panicles not longer than the leaves." The bracts of our plant are puberulous, but the flowers are never hairy.

## Ampelideæ.

### *Vitis* LINN.

***Vitis* (*Tetrastigma*) *arisanensis* HAYATA n. n. *Vitis umbellata* HEMSL. var. *arisanensis* HAYATA Ic. Pl. Formos. III. p. 63. Descriptio auctata: Flores dioecii. Flores ♂: umbellati, pedunculis longis glabris ad apicem incrassatis ad capitulum semiglobosum expansis, capitulis facie cupulas minimas numerosas gerentibus, pedicellis (radiis umbellarum) cum cupula articulatis. Pedicelli 7-8 mm. longi glabri subteretes vel plus minus complanati sursum plus minus dilatati ad apicem ad calycem subplanum expansis. Calyx planus  $1\frac{1}{3}$  mm. in diametro clobatus ultra receptaculum circ.  $\frac{1}{3}$  mm. exteriore expans margine subinteger. Petala 4 subrubescencia in alabastro erecta in apertienti subpatentia suberecta haud reflexa lineari-oblonga  $3\frac{1}{2}$  mm. longa  $1\frac{1}{3}$  mm. lata apice subito**

triangulâri-acuta basi plus minus contracta obtusa ad basin  $\frac{1}{4}$  mm. lata margine integra plus minus plicata valvata utraq. facie glabra levîa sed extus dorso versus apicem sub lente botryoideo-muricata intus concava præsertim versus apicem profunde concava. Stamina 4 e receptaculo oriunda  $2\frac{1}{2}$  mm. longa, filamentis glabris complanatis 2 mm. longis  $\frac{1}{3}$  mm. latis utrinque acutis, antheris late cordatis vel rotundatis glabris latioribus quam longis utrinque emarginatis  $\frac{1}{2}$  mm. latis. Rudimentum ovarii cum disco obconico-tetragonum basi  $\frac{2}{3}$  mm. latum apice 2 mm. latum apice perfecte truncatum planum ad centrum impressum. Fl. ♀: 3 mm. longi. Calycis lobi 4 brevissimi late rotundati deorsum reflexi  $\frac{1}{3}$  mm. longi margine ciliolati. Petala 4 elongato-triangulâri-oblonga 3 mm. longa  $1\frac{1}{2}$  mm. lata apice intus cuculliforme concava obtusa inferiore apice apiculata exteriore dorso apice cornuta, cornibus  $\frac{1}{4}$  mm. longis, basi rotundata latissima ad insertionem  $\frac{1}{2}$  mm. lata intus glabra levîa extus glabrâ plus minus verrucosa margine integra valvata. Staminodia 4 extranectarina minuta  $\frac{2}{3}$  mm. longa, antheris abortivis minutis. Discus pulviniformis ad basin ovarium situs. Ovarium cum stylo conicum cum stylo 2 mm. longum basi latissimum 2 mm. latum, stylo brevissimo, stigmate dilatato plus minus 4-lobato; ovarium 2-loculare, loculis 2-ovulatis.

HAB. Mt. Arisan, prope Heishana, Mai. 1913, leg. S. SASAKI (Fl. ♂); ibidem, leg. B. HAYATA, Aprili. 1914. (Fl. ♀).

**Vitis** (*Tetrastigma*) **shifunensis** HAYATA n. n. *Vitis triphylla* HAYATA Mater. Fl. Formos. p. 63.

As the name *V. triphylla* is used for another older species, a new name is here taken for our plant.

**Vitis** (*Tetrastigma*) **bioritsensis** HAYATA n. n. *Vitis dentata* HAYATA Mater. Fl. Formos. p. 62.

As the name *Vitis dentata* is used for another older species, a new name is here taken for our plant.

## Sabiaceæ.

### *Sabia* COLEBR.

**Sabia transarisanensis** HAYATA sp. nov. (Tab. V.). Frutex scandentissimus plus minus volubilis; rami teretes in vivo virides, medulla solida, cortice

lævi haud vel tenuissime lenticellato elevato-ruguloso glaberrimo, cicatricibus foliorum elevatis semi-rotundatis  $1\frac{1}{2}$  mm. latis, ramuli gracillimi hornotini foliati basi perulis triangularibus subrotundatis 1 mm. longis ciliatis 2-3-seriatim dispositis et cataphyllis binis obovato-spathulatis 8mm. longis suffulti. Folia membranacea alterna ovato-oblonga vel oblonga 4cm.-6cm. longa 18mm.-30mm. lata apice acuta vel breve acuminata ad summum obtusa basi obtusa vel acuta margine tenuiter cartilagineo-marginata obscure denticulata, denticulis minutis apice ciliolatis, membranacea supra in vivo pallido-viridia subtus pallidissimo-cinerea, nervis venis venulis rubro-coloratis subtus distincte reticulatis tenuissimis, utraque pagine glabra. costis venisque utraque pagine haud vel vix elevatis subplanis, costa flexuosa haud recta, venis lateralibus primariis utroque latere costæ 5-6 arcuatis, mediis basi angulo  $50^\circ$  a costa egressis, venulis grosse reticulatis, petiolis 4-6 mm. longis rubescentibus, stipulis nullis. Flores ad axillas foliorum ramulorum hortoniorum solitarii vel gemini longe pedicellati, pedunculis ad axillas semper solitariis ebracteatis gracilibus glaberrimis 1cm. longis vel apice furcatim 1-plo ramosis, ramis vel pedicellis pedunculo brevioribus a se angulo  $90^\circ$  egressis 5-6 mm. longis, vel pedunculis simplicibus haud ramosis florem singulum gerentibus. Sepala 5 virilia subaequalia oblonga 2 cm. longa  $1-1\frac{1}{2}$  mm. lata apice obtusissima basi vix vel haud contracta paralleliter multi-nervia glaberrima. Petala 5-6 subpatentia fusco-purpurascencia oblongo-quadrangularia 5 mm. longa  $2\frac{1}{2}$  mm. lata apice rotundata basi haud contracta ad insertionem 2mm. lata glabra sub-5-nervia margine integra. Stamina 5-6 petalo breviora glabra, filamentis  $2\frac{1}{2}$  mm. longis leviter dorso complanatis subteretibus, antheris rotundatis minus quam 1 mm. latis longisque utrinque emarginatis 2-locularibus, loculis valvis singulis dehiscentibus. Discus pulviniformis sub ovario situs leviter 5-lobatus  $\frac{1}{3}$  mm. altus. Ovarium globoso-conicum  $\frac{1}{2}$  mm. longum totiusque latum glabrum læve 2-loculare, loculis 2-ovulatis, apice ad stylum abeuns, stylo validiusculo basi cum ovariis aequilato  $3\frac{1}{2}$  mm. longo columniformi glabro apice punctiformi stigmatoso, stigmate punctiformi minuto.

HAB. Mt. Arisan Tozan, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

Very distinct for its small and thin leaves not exceeding 5 cm. in length.



## Coriarieæ.

*Coriaria* LINN.

**Coriaria summicola** HAYATA sp. nov. (Tab. VI.). Frutex 1-2 m. altus ramosissimus, rami glabri tetragoni ad angulos subalati vel acuti, cortice fulvo-cinerascenti glabro in adulto longitudinaliter irregulariter fissis lenticellato, lenticellis longitudinaliter lentiformibus 1 mm. longis medio fidis vel haud fidis valde elevatis, ramuli hortonii graciles purpureo-rubescerites glaberrimi tetragoni foliati basi perulis oblongo-triangularibus acutis costatis rubescentibus  $\infty$ -seriatim dispositis suffulti. Folia opposita oblonga vel ovato-oblonga circ.  $3\frac{1}{2}$  cm. longa circ. 13 mm. lata apice acuta vel brevissime acuminata basi cuneata vel cuneato-rotundata margine integerrima membranacea vel membranaceo-chartacea utraque pagine glabra supra fulvo-viridia subtus fulvo-pallidiora 3-nervia, nervis lateralibus basi angulo acuto divergentibus sed sursum convergentibus ad axem foliorum attingentibus, venis supra minus subtus plus elevatis, petiolis brevissimis 1-2 mm. longis, pulvinis elevatis, stipulis minutissimis triangularibus acutis  $\frac{1}{4}$  mm. longis. Racemi ad apicem ramulorum hornotinorum lateraliu terminales vel e ramo annotino laterali oriundi, generaliter racemis floribus masculinis inferioribus, racemis floribus fœmineis superioribus. Flores monœcii. Racemi masculini a basi usque ad apicem floriferi laterales 2-3 cm. longi basi perulis multiseriatim suffulti, perulis rubescentibus triangularibus 3-meris 5-seriatim dispositis apice obtusis, interioribus longioribus 3 mm. longis, bracteis sub flore singulo unis ovato-rhomboideis 3 mm. longis glabris totiusque latis apice triangulari-obtusis basi triangulari-contractis ad insertionem 1 mm. latis, dimidio superiore rubro dimidio inferiore pallido-viridi, glabris intus valde concavis extus convexas margine ceroso-integris, pedicellis 2 mm. longis glabris. Flores ♂ : Sepala 5, subæqualia rotundato-rhomboidea  $2\frac{1}{2}$  mm. longa 2 mm. lata apice triangulari-acuta basi plus minus contracta ad insertionem  $\frac{1}{2}$  mm. lata intus concava extus convexa glaberrima prope apicem sursumque rubescentia. Petala 5 minuta in magnitudine variabilissima oblongo-linearia  $\frac{1}{2}$ -1 mm. longa  $\frac{1}{2}$  mm. lata glabra apice truncata vel emarginata basi leviter contracta extus plus minus convexa intus concava intus medio prominente carinata, carinis elevatis. Stamina circ. 10 longe exserta, filamentis filiformibus longis-

simis crispatis plus 5 mm. longis sepalum duplo superantibus glabris, antheris versatilibus oblongo-linearibus  $2\frac{1}{2}$  mm. longis 1 mm. latis apice connectivo vix producto latiusculo truncato vel emarginato terminatis basi 2-lobatis, lobis basi breve caudatis flavis apice rubescentibus, facie minute muricatis. Rudimentum ovarii nullum. Flores ♀: pedicelli longiores 3 mm. longi rubescentes glabri. Sepala 5 erecta inæqualia exteriora 3 rotundato-ovata  $2\frac{1}{2}$  mm. longa 2 mm. lata glaberrima apice obtusissima vel truncata basi obtuso-contracta ad insertionem  $\frac{1}{2}$  mm. lata margine subintegra sed parte apicali eroso-denticulata intus valde concava medio tenuiter carinata, interiora 2 minora. Petala 5 subæqualia sepalum  $\frac{1}{2}$ -plo æquantia oblonga 1 mm. longa  $\frac{2}{3}$  mm. lata apice  $\frac{2}{3}$  mm. lata apice acuta basi truncata ad insertionem  $\frac{1}{3}$  mm. lata integra crassissima inter carpella firme inserta erecta extus convexa intus concava medio prominente carinata apice interiore recurva glaberrima. Staminodia existunt vel in abortu ad nullum reducta. Carpella 5 auriculiformia semi-oblonga  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata latere valde compressa glaberrima dorso rotundata facie recta facie ventrali centrali se connata cæterum libera, stylis rectis 1 mm. longis teretibus erectis glabris sursum ad stigmata linearia recurva abeuntibus, stigmatibus cum stylo æquilatis teretibus deorsum valde recurvatis  $1\frac{1}{2}$  mm. longis rubescentibus minute botryoideo-tuberculatis; carpella 1-locularia 1-ovulata, ovulis pendulis anatropis, raphe dorsali. Fructus ignoti.

HAB. Mt. Arisan: Tōzan, leg. B. HAYATA, Aprili. 1914. (Fl. ♀ et ♂).

Allied to *Coriaria sinica* MAXIM., *C. nepalensis* WALL., *C. japonica* and *C. intermedia* MATSUM. The new species differs from the first two in having the leaves which are acute or obtuse but never rounded at the base, and in the male flowers which are nearly entirely wanting of rudimentary ovaries; from *C. japonica* by the recurved stigmas and the presence of staminodes or stamens in the female flowers; and from the last, by much acuter sepals and larger stamens. *Coriaria intermedia* is found generally at the lower mountains, while the new plant exists only on the top of the mountains nearly 8000 ft. high above sea-level.

## Leguminosæ.

*Bauhinia* LINN.

**Bauhinia** (*Phanera*) **Championi** BENTH. Fl. Hongk. p. 99; HAYATA Ic. Pl. Formos. I. p. 211 "A woody climber, the young branches, under side of the leaves, and inflorescences hoary with a minute tomentum, but otherwise glabrous. Leaves broadly cordate, 5-7-nerved,  $2\frac{1}{2}$ -4 in. long, 2 to  $2\frac{1}{2}$  in. broad, divided to about one-third into 2 broad obtuse lobes. Tendrils single, leaf-opposed. Racemes leaf-opposed, simple or several together at the ends of the branches, 4 to 8 in. long, flowering nearly from the base. Flowers pedicellate, white. Calyx-tube very short, lobes lanceolate, about 2 lines long. Petals scarcely longer, nearly equal, with a few hairs outsides. Stamens 3, about twice as long as the calyx, the other 7 very minute or wanting. Pod about 3 in. long, 1 in. broad, 3- to 5-seeded. Common in ravines."—BENTH. l.c. p. 99. Our plant accords pretty well with the above quoted description. A very slight discordance is to be seen in the petals which in our plant are much longer than the calyx-lobes and also in the stamens which in our plant are much longer than in the description. Our specimen is lacking fruit.

HAB. Mt. Daiton, leg. T. SŌMA, Dec. 1913.

## Rosaceæ.

*Prunus* LINN.

**Prunus** (§ *Laurocerasus*) **macrophylla** SIEB. et ZUCC. Fl. Jap. Fam. Nat. 14; FORBES et HEMSL. Ind. Fl. Sin. I. p. 219.

Arbriuscula? Rami et ramuli atro-purpurascetes vel cinerascetes interdum subnitidi in exsiccatō parce minute lenticellati, cortice interdum longitudinaliter fisso. Folia in exsiccatō viridescētia chartacea oblonga vel obovato-oblonga  $6\frac{1}{2}$ -9 cm. longa 3-4 cm. lata apice cuspidato-acuminata vel cuspidato-acuta basi cuneato-obtusa vel obtusissima margine serrulata, serrulis mediis 2 mm. latis  $\frac{1}{2}$  mm. longis, versus basin integra utraque pagine glabra, costa supra plus minus elevata media tenuiter sulcata subtus elevata sed facie complanata, venis lateralibus primariis utroque facie tenuissime elevatis utroque latere costæ 7-9, mediis a costa angulo circ. 50° egressis arcuatis

sursum furcato-ramosis cum eis superioribus junctis, arcolis inter venas apice a margine 4-5 mm. distantibus, venulis grosse reticulatis supra haud visis subtus vix visis, margine angustissime cartilagineo-marginata, serrulis apice mucrone minute instructis, mucronibus fusco-rubrescentibus, petiolis 7 mm. longis dorso complanatis tenuissime sulcatis vel haud sulcatis intus pubescentibus  $1\frac{1}{2}$  mm. latis medio glandulis 2 oppositis instructis, glandulis rubescentibus elevatis cupuliformibus minus quam 1 mm. in diametro, vel glandulis haud instructis, stipulis caducissimis ad axillam e ramulo oriundis lineari-oblongis 3-4 mm. longis minus quam 1 mm. latis apice acutis basi plus minus dilatatis 1 mm. latis crassiusculis glabris. Flores spicati, spicis ad folium annotinum superiorem axillaribus solitariis simplicibus vel pauca ramosis 4-5 cm. longis cum floribus  $1\frac{1}{2}$  cm. latis densissime floratis, rhachibus dense villosa-hirsutis, bracteis basi pedicellorum sitis semirotundatis  $1\frac{1}{2}$  mm. longis 2 mm. latis apice rotundato-obtusis utraque pagine villosa-hirsutis basi  $\hookleftarrow$ -formibus valde concavis caducissimis crassissimis ad insertionem 1 mm. latis, pedicellis brevissimis 1 mm. longis hirsutis. Calyx latissime campanulatus cum lobis 3 mm. longis circ. 6 mm. in diametro ad circ. dimidium lobatus extus brevissime villosa-hirsutus intus glaber, lobis 5 late triangularibus  $1\frac{1}{2}$  mm. longis basi 2 mm. latis apice acutis vel obtusis extus hirsutis intus glabris margine ciliolatis, sinibus inter lobos late triangularibus obtusis. Petala 5 late rotundata 3 mm. longa latiora quam longiora apice late rotundata basi late rotundato-cuneato-contracta ad insertionem  $\frac{1}{4}$  mm. lata margine ciliolata utraque glabra alba. Stamina  $\infty$  ad basin lobi (inter partem lobatam et partem haud lobatam calycis) 2-seriatim disposita, antheris reniformibus latioribus quam longioribus utrinque emarginatis plus quam  $\frac{1}{2}$  mm. longis, filamentis glabris complanatis longioribus 3 mm. longis basi triangulari-dilatatis, partibus dilatatis plus quam  $\frac{1}{2}$  mm. latis, apice subulato-angustatis glabris. Ovarium rotundato-ovoideum 1 mm. longum totiusque latum glabrum in fundo calycis situm apice ad stylum abeuns, stylo columnari plus minus recurvo 3 mm. longo glabro  $\frac{1}{3}$  mm. crasso apice stigmatifero, stigmate peltiformi plus minus oblique oblongo  $\frac{2}{3}$  mm. in longo diametro  $\frac{1}{2}$  mm. in brevi diametro; ovarium 1-loculare 2-ovulatum.

HAB. Shintiku: Karizenzan, leg. R. Kanehira, Oct. 1914 (Fl.).

DISTRIB. Southern China, Loo-choo and Japan.

**Prunus transarisanensis** HAYATA sp. nov. Arbruscula; ramuli purpur-  
 ascentes vel cinerascens in exsiccatō nitidi haud rugosi vel versus apicem  
 ramulorum longitudinaliter rugosi subtetragoni, cortice lenticellis elevatis ro-  
 tundatis  $\frac{2}{3}$  mm. in diametro parce notato. Ramuli annotini basi cicatricibus  
 foliorum dense notati, cicatricibus late semi-rotundatis, pulvinis prominente  
 elevatis semi-cupuliformibus. Folia decidua ad basin ramulorum hornotinorum  
 approximativē denseque sita vel versus apicem ramulorum remote alternatim  
 sita membranacea ovato-oblonga 3–5 $\frac{1}{2}$  cm. longa 1 $\frac{1}{2}$ –2 $\frac{1}{2}$  cm. lata apice caudato-  
 acuminata basi truncata vel rotundato-truncata vel obtusa margine argute ser-  
 rulata, serrulis mediis ascendentibus interiore vel exteriorē recurvis aristato-  
 linearī-triangularibus latere superiore 1 mm. longis latere inferiore 3 mm. longis  
 $\frac{1}{2}$ – $\frac{1}{4}$  mm. latis, versus basin truncata utraq. pagine glabra, costa supra tenui-  
 ter sulcata subtus elevata, venis lateralibus primariis supra haud elevatis subtus  
 vix elevatis, subtus ad axillas inter costam et venas hirsuta, venis lateralibus  
 primariis utroque latere costae 6–7, mediis a costa angulo circ. 40° egressis  
 arcuatis cum eis superioribus junctis, venulis reticulatis, reticulis minutis  
 utraq. pagine vix vel distincte visis, subtus pallidiora, petiolis 8 mm. longis  
 intus dense hirsutis extus glabris intus planis medio angustissime sulcatis apice  
 intus glandulis 2–oppositis instructis, glandulis minutis cupuliformibus com-  
 planatis  $\frac{1}{2}$  mm. in diametro fusco-rubescens, stipulis ad axillas e ramulo  
 oriundis linearibus glabris 3–5 mm. longis 1 mm. latis margine ciliolato-serru-  
 latis ciliolis apice glanduloso-globuligeris. Flores versus apicem ramulorum  
 annotinorum ad basin ramulorum hornotinorum quasi-fasciculatim siti, fasci-  
 culis alternatim approximativē 2–3 sitis vel ad ramulos annotinos lateraliter  
 solitariterque siti, fasciculis (in sensu vero racemis) 2–3-floratis 2 $\frac{1}{2}$  cm. longis  
 basi multiseriatim perulatis, perulis extimis minutis subrotundatis 3 mm.  
 longis latioribus quam longioribus apice rotundatis extus valde convexis intus  
 valde concavis ad basin  $\cap$ -formibus rubescens glabris margine glanduloso-  
 ciliolatis, (ciliolis rotundiformibus complanatis  $\frac{1}{10}$  mm. longis), interioribus vel  
 intimis oblongo-spathulatis 7 mm. longis 4 mm. latis apice rotundatis basi late  
 cuneatis ad basin truncatis extus glabris intus villosis-hirsutis extrorsum reflexis  
 sed sursum valde concavis inflexis margine glanduloso-ciliolatis, ciliolis  $\frac{1}{4}$  mm.  
 longis obtusis, bracteis cuneato-rotundatis 3 mm. longis 2 $\frac{1}{2}$  mm. latis apice

rotundatis ad basin  $1\frac{1}{2}$  mm. latis truncatis —formibus pedicellum amplexantibus margine glanduloso-ciliolatis, ciliolis apice obtusis  $\frac{1}{2}$  mm. longis ascendentibus plus minus recurvis, bracteis rubescentibus; pedicellis viridibus 7 mm. longis totis subæquilongis hirsutis, pilis patentissimis. Calyx tubuloso-campanulatus 8 mm. longus, tubo viridi 3 mm. longo sursum  $2\frac{1}{2}$  mm. lato subcylindrico vel sursum plus minus latiore intus extusque glabro, limbo late campanulato cum lobis 5 mm. longo ad  $\frac{2}{3}$  5-lobato, lobis triangulari-oblongis rubescentibus 3 mm. longis  $2\frac{1}{2}$  mm. latis apice acutis basi plus minus contractis utroque pagine glabris, sinibus inter lobos angustissime obtusis. Petala subalba vel leviter rosea obovato-oblonga oblonga vel ovato-oblonga vel rhomboideo-oblonga 7 mm. longa  $4\frac{1}{2}$ –5 mm. lata apice ambitu obtusissima rotundata retusa vel emarginata ad centrum apicis emarginati breve mucronata vel haud mucronata basi subito cuneato-contracta vix vel haud unguiculata ad insertionem  $\frac{1}{4}$  mm. lata glabra. Stamina ad partem limbi calycis haud lobatam circ.  $1\frac{1}{2}$  mm. longum multiserialiter inserta in longitudine variabilia, extimis longissimis 5–6 mm. longis cum petalis æquilongis vel quam petalis leviter brevioribus, filamentis glabris, antheris sub rotundatis utrinque emarginatis minus quam  $\frac{1}{2}$  mm. longis. Ovarium ovoideum in fundo calycis situm  $1\frac{1}{2}$  mm. longum plus quam 1 mm. latum apice ad stylum abeuns glabrum intus (ventrali) tenuissime 1-sulcatum, sulcis per stylum usque ad stigma abeuntibus, stylo 8–9 mm. longo columnari-filiformi  $\frac{2}{3}$  mm. crasso, stigmate capitato-infundibuliformi 1 mm. in diametro latere uno fissio  $\frac{1}{3}$  mm. alto.

Very closely allied to, if not identical with, the Japanese species *Prunus Yamasakura* (a wild mountain-cherry). I do not think our plant is ever distinct specifically from the named species. The only difference between them is that the stipules of our plant are much narrower and serration of the leaves is a little looser, than those and that of the Japanese. It may constitute a subspecies or a variety of the latter. I am quite unwilling to treat our plant as a species distinct from the Japanese cherry; yet, the latter is so very confusing as to its proper name that it is at present as equally subject to alteration to place the Formosan plant under one name as under others.

HAB. Mt. Arisan: Tōzan, ad 7500 ped. alt., leg. R. KANEHIRA, I. TANAKA, et B. HAYATA, Aprili. 1914.

*Rubus* LINN.

**Rubus aculeatiflorus** HAYATA sp. nov. Suffrutex. Folia simplicia in ambitu triangulari-ovata 8 cm. longa  $5\frac{1}{2}$  cm. lata apice acuminata ad summum acuta basi leviter cordata vel cordato-truncata ima basi ad extremitatem perfecte truncata ad petiolum haud abeuntia margine duplicato-serrata vel serrata (serris ascendentibus ~-formibus apice cuspidatis 2 mm. longis 1 mm. latis vel minoribus) clobata vel tenuiter 3-lobata, lobo terminali ovato 5 cm. longo  $3\frac{1}{2}$  cm. lato apice acuminato basi plus minus contracto ad basin 3 cm. lato, lobis lateralibus latere superiore recto 1 cm. longo latere inferiore curvo ab apice usque ad basin  $4\frac{1}{2}$  cm. longo auriformibus, 3-nervia, nervo centrali 8 cm. longo recto, nervis basilaribus 38 mm. longis rectis ad apicem loborum lateralium attingentibus a nervo centrali angulo  $45^\circ$  egressis venis primariis lateralibus nervi centralis utroque latere 6-7 rectis ad apicem serrarum attingentibus, mediis a costa angulo  $40^\circ$  egressis, venis primariis nervorum basilarium extrorsum 4-5, venulis inter venas primarias rectangulariter transversis minute distincte reticulatis, pagine utraque subglabra ad nervos venas primariasque tenuiter pilis brevissimis dispersa, supra in exsiccatō fuscentia subtus pallido-fulvescentia, nervis venis primariis supra haud vel vix elevatis vel interdum tenuiter impressis subtus distincte elevatis, reticulis venularum supra impressis subtus tenuiter elevatis distincte coloratis distincte visis, petiolis  $1\frac{1}{2}$ -3 cm. longis breve villosopubescentibus plus minus complanatis aculeatis, aculeis paucis a se 1 cm. remotis latere compressis triangularibus apice cuspidatis deorsum recurvis  $1\frac{1}{2}$  mm. longis basi  $1\frac{1}{2}$  mm. latis, stipulis petiolo oriundis ab axillis 3 mm. distantibus linearibus 4 mm. longis 1 mm. latis. Flores ad apicem ramulorum lateralium brevium terminales solitarii penduli, pedicellis plus quam 2 mm. longis gracilibus pubescentibus aculeis minutis 1-2 instructis. Calyx viridis; calycis cupula 7 mm. in diametro dorso extus leviter elevata dense villosopubescentis setosa, setis minus quam 1 mm. longis conico-teretibus acutis apice interdum glanduloso-globuliferis interdum haud globuliferis. Calycis lobi subtriangulares apice longe caudati caudis exceptis 7 mm. longi 6 mm. lati (sinibus inter lobos acutis), caudis linearibus 3-4 mm. longis ad summum obtusis medio circ. 1 mm. latis, dorso villosopubescentes dorso medio deorsum setulosi, setulo apice glanduloso-globulifero, ad marginem et medio sursum

usque apicem caudæ haud setosi villo-pubescentes, intus (basibus glabris exceptis) villosopubescentes. Cupula calycis intus glabra concava ad centrum pilosa, cicatricibus receptaculorum 2 mm. in diametro. Petala alba patentia, late rotundato-ovata apice triangulari-rotundata basi late rotundata ad centrum brevissime cuneato-acuta ad insertionem  $\frac{1}{3}$ – $\frac{1}{2}$  mm. lata 8 mm. longa  $8\frac{1}{2}$  mm. lata margine integra concava intus paucissime hirsuta vel haud hirsuta extus glaberrima. Stamina  $\infty$  ultra cupulam ad basin lorum calycis sita, filamentis longioribus  $4\frac{1}{2}$  mm. longis complanatis  $\frac{1}{3}$  mm. latis apice angustioribus glabris, antheris oblongis 1 mm. longis  $\frac{2}{3}$  mm. latis apice emarginatis basi 2-lobatis margine ciliolatis dorso medio fusco-coloratis, partibus coloratis linearibus. Receptaculum cum carpellis ovoideum 7 mm. longum  $5\frac{1}{2}$  mm. latum semiglobosum circ. 2 mm. longum 2 mm. in diametro glabrum haud pilosum. Carpella semioblonga plus 1 mm. longa quam  $\frac{1}{3}$  mm. lata latere complanata apice oblique acuta gradatim ad stylum abeuntia basi haud vel vix contracta perfecte sessilia facie latere ventrali glabra dorso paucè barbata, stylis 5 mm. longis teretibus  $\frac{1}{10}$  mm. latis (basi piloso excepto) totis glabris apice oblique truncatis, stigmate oblique obscure 2-lobato botryoideo-muricato subrecto subrecto.

HAB. Mt. Arisan: Mingetzukei, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

Very near *Rubus taitensis* HAYATA, but distinguishable from it in having glandular setæ, besides prickles, on the under surface of the calyx-cups. Also near *Rubus mingetsensis* HAYATA, but differs from it in having calyx with glanduliferous setæ on the back and with shorter tails at the apex of the lobes, and in the nearly glabrous petals, semiglobose receptacles, less pilose carpels, nearly erect styles and aculeolate pedicels.

**Rubus mingetsensis** HAYATA sp. nov. (Fig. 11). Suffrutescens. Rami laeves minute pubescentes fusciscentes teretes remote aculeolati, aculeolis minutis  $1\frac{1}{3}$  mm. longis subteretibus vel triangulari-formibus plus minus complanatis basi subito dilatatis, haud foliati. Ramuli alterni a se 4 cm. remoti 2-4-foliati floribus singulis terminati pubescentes basi perulis multiserialiter dispositis instructi, perulis fulvo-rubescensibus extus pubescentibus intus glabris obovatis 7 mm. longis. Folia a se 1 cm. remota chartacea triangulari-ovata vel ovata 6-8 cm. longa 38-55 mm. lata apice triangulari-acuminata basi simpliciter



leviterque cordata margine irregulariter serrata, (serris majoribus 2 mm. latis  $1\frac{1}{2}$  mm. longis apice cuspidato-acutis  $\sim$ -formibus ascendentibus), leviter 3-lobata, lobo terminali dimidium foliorum in longitudine æquanti vel superanti elongato-triangulari-ovato  $3\frac{1}{2}$ –5 cm. longo  $2\frac{1}{2}$ –3 cm. lato apice acuminato ad summum acuminatissimo basi leviter contracto, lobis lateralibus oblongo-auriculiformibus apice late triangulari-obtusis vel triangulari-acutis ad apicem angulo  $80^\circ$  egressis, latere superiore subrectis 6–12 mm. longo, latere inferiore recurvo versus basin subito rotundato, utraque pagine tenuiter pubescentia vel subglabra supra in exsiccatò fuscentia subtus pallido-fulvescentia 3-nervia, nervo centrali recto, nervis lateralibus in longitudine dimidium nervi centralis æquantibus vel superantibus, venis lateralibus primariis nervi centralis utroque latere 5–6, mediis a costa angulo  $35^\circ$  egressis, nervis lateralibus a nervo centrali angulo  $40^\circ$ – $45^\circ$  egressis, venis lateralibus primariis nervorum lateralium extrorsum 5–6 angulo  $40^\circ$  egressis, venis lateralibus subrectis ad apicem serrarum principalium attingentibus, venulis inter venas laterales transversis recurvis, reticulis venularum subtus distincte coloratis supra vix visis tenuiter impressis subtus elevatis distincte visis, petiolis  $1\frac{1}{2}$ –3 cm. longis brevissime villosopubescentibus intus canaliculatis haud vel vix aculeolatis, stipulis a petiolo oriundis ab axilla 1–2 mm. distantibus linearibus 3 mm. longis  $\frac{1}{2}$  mm. latis pubescentibus. Flores ad apicem ramulorum lateralium terminales solitarii, pedicellis  $2\frac{1}{2}$  cm. longis gracilibus subpendulis pubescentibus haud glandulosis. Calyx viridis; cupula dorso subplana vel tenuiter convexa 6 mm. in diametro villosopubescentibus versus centrum vix versus marginem valde setosa, setis teretibus plus vel minus quam 1 mm. longis

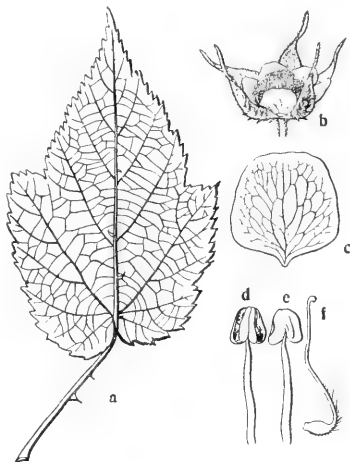


Fig. 11, *Rubus mingetensis* HAYATA; a, a leaf, natural size; b, a flower,  $\times 1.5$ ; c, a petal,  $\times 3$ ; d, e, stamens, seen from different sides  $\times 4.5$ ; f, a carpel, magnified.

acutis; lobis calycis elongato-triangularibus apice longe caudatis caudis exceptis 6 mm. longis  $4\frac{1}{2}$  mm. latis, (caudis linearibus 6 mm. longis medio  $\frac{1}{2}$  mm. latis), extus dorso villosopubescentibus versus basin setosis sursum usque ad apicem caudæ haud setosis margine integris intus minus pubescentibus; cupula intus vix concava glabra, cicatricibus receptaculorum magnis 3 mm. in diametro. Petala alba semi-clausa vel rarius patentia rotundata  $6\frac{1}{2}$  mm. longa 6 mm. lata apice rotundata basi rotundata ad extremitatem subito acuta ad insertionem  $\frac{1}{2}$  mm. lata margine integra extus glabra intus pauce hirsuta, venis grosse reticulatis. Stamina  $\infty$  ad marginem cupulae inserta, filamentis in longitudine variabilibus 4 mm. longis  $\pm$  complanatis glabris  $\frac{1}{3}$  mm. latis apice subulatis, antheris ovato-oblongis  $\frac{4}{5}$  mm. longis apice emarginatis basi 2-lobatis margine ciliatis dorso medio late fuscentibus. Receptaculum elevatum 3 mm. in diametro haud globosum sed plano-elevatum ad marginem pilosum versus centrum glabrum. Carpella  $\infty$  semi-oblonga 1 mm. lata latere complanata basi brevissime stipitata apice sursum recurva gradatim ad stylum abeuntia sursum hirsuta, stylo filiformi 4 mm. longo  $\sim$ -formiter recurvo sursum glabro deorsum basi hirsuto apice stigmatibus terminato, stigmatibus globosis dense botryoideo.

HAB. Mt. Arisan: Mingetsukei, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

Very near *Rubus aculeatiflorus* HAYATA, but separable from it in having much longer unarmed peduncles, in the half-closed flowers with the calyx which is afforded with minute prickles on the back but quite destitute of any glandular seta, and by the leaves which are cordate at the base; in *R. aculeatiflorus* HAYATA, the leaves are truncate at the apex of the petioles and slightly cordate towards the outer sides.

**Rubus glanduloso-calycinus** HAYATA sp. nov. Suffrutex; rami et ramuli teretes flexuosi, cortice sublevi rubro-fulvescenti sub lente minute lenticellato, lenticellis longitudinaliter dispositis, sub lente tenuiter striati remote grosse aculeati, aculeis cuspidiformibus 5 mm. longis sursum subteretibus deorsum latere complanatis basi dilatatis, partibus dilatatis  $2\frac{1}{2}$  mm. latis rubescentibus deorsum recurvis, sparse vel dense valde barbati, barbis transverse patentissimis validissimis 4–5 mm. longis apice globuliferis vel haud globuliferis apice uncinato-recurvis vel rectis rubescentibus. Folia membranacea

alterna cum petiolis  $4\frac{1}{2}$ –8 cm. longis  $2\frac{1}{2}$ –4 cm. lata in ambitu oblongo-ovata  
 5-foliolata supra plus subtus minus hirsuta, foliolo terminali oblongo-ovato  
 17–27 mm. longo 10–13 mm. lato apice acuto basi obtuso truncato vel ro-  
 tundato margine duplicato-dentato, dentibus primariis  $2\frac{1}{2}$  mm. latis totiusque  
 longis in ambitu truncatis vel obtusis denticulatis, denticulis serruliformibus  
 argute acutis cuspidiformibus vel aristato-acutis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$ – $\frac{1}{3}$  mm. latis  
 ascendentibus, supra costis venis haud vel vix impressis subtus plus minus  
 elevatis, venis lateralibus primariis utroque latere costae 7–9 rectissimis, mediis  
 a costa angulo  $30^{\circ}$ – $40^{\circ}$  egressis ad apicem dentium primariorum attingenti-  
 bus, venulis minute reticulatis obscuris, costa subtus minute remoteque acu-  
 leolata, foliolis lateralibus ovato-oblongis oppositis 15–18 mm. longis quam  
 foliolo terminali minoribus conformibus sed plus minus obliquis, petiolulo  
 terminali 5–13 mm. longo, interjuga 10–15 mm. longa, petiolulis foliorum  
 lateralium brevissimis, petiolo communi (i.e. ab axillis usque ad foliorum  
 jugam infimam) 20–25 mm. longo toto remote aculeolato (aculeis deorsum  
 uncinato-recurvis majoribus 1–2 mm. longis), toto glanduloso-barbato, barbis  
 patentissimis transverse sitis apice globuligeris circ. 1 mm. longis, stipulis a  
 basi petioli oriundis lineari-lanceolatis acuminatis 4 mm. longis 1 mm. latis  
 margine remote glanduloso-ciliatis dorso hirsutis intus glabris. Flores ad  
 apicem ramulorum terminales solitarii vel pauci-racemosi, racemis 1–2-flora-  
 tis. Pedicelli 13 mm. longi pauce aculeati, aculeis  $1\frac{1}{2}$  mm. longis deorsum  
 recurvis, setulosi, setulis barbi-formibus 2 mm. longis vel brevioribus paten-  
 tissimis apice globulatis, paucissime pilosi vel haud pilosi. Calycis cupula  
 6 mm. in diametro dorso subtus pauce setulosa haud vel vix pilosa tenuiter  
 obscureque radiatim 10–costulata dorso subtus versus centrum depressa: limbo  
 calycis ultra cupulam 1 mm. expanso-producto; lobis 5 elongato-triangularibus  
 apice longe caudatis (caudis exceptis) 7 mm. longis basi  $4\frac{1}{2}$  mm. latis ad  
 basin latissimis dorso subtus paullo setulosis dorso subtus medio obscure 1-  
 costulatis ad marginem dense hirsutis, caudis linearibus 4 mm. longis medio  
 $\frac{1}{3}$  mm. latis utroque glabris intus profunde sulcatis: calycis lobis intus areola  
 basilari triangulari glabra excepta dense villosis: cupula calycis intus glabra  
 sed ad centrum circa receptaculum carpellorum dense pilosa, cicatricibus  
 receptaculorum 1 mm. in diametro. Petala ovata 13 mm. longa 9 mm. lata

apice rotundata basi rotundata ad extremitatem breve cuneato-obtusa ad insertionem 1 mm. lata margine subintegra intus glabra multinervia extus paucè hirsuta. Stamina  $\infty$  ad marginem cupulæ inserta, filamentis glabris in longitudine variabilibus longissimis exterioribus longioribus complanatis  $4\frac{1}{2}$  mm. longis, antheris linearibus  $1\frac{1}{3}$  mm. longis  $\frac{1}{2}$  mm. latis apice emarginatis basi 2-lobatis, lobis  $\frac{1}{2}$  mm. longis. Receptaculum carpellorum cum carpellis late globosum latius quam longius 4 mm. longum  $5\frac{1}{2}$  mm. latum pilosum; carpellis semi-ovoideis latere complanatis plus  $\frac{1}{3}$  mm. longis glabris, stylis e latere apicis carpellorum oriundis filiformibus  $1\frac{2}{3}$  mm. longis apice obtusis, stigmate terminali 2-lobato.

Near *Rubus pungens* CAMB. var. *Oldhamii* MAXIM.; but easily distinguishable from it by the much more densely strongly barbate branches and especially by the densely and strongly barbate calyx.

HAB. Mt. Shiehseitonzan, leg. S. SASAKI, Mart. 1911. (Fl.)

**Rubus euphlebophyllus** HAYATA sp. nov. Suffrutex: rami et ramuli haud flexuosi sub-recti teretes in exsiccatò rubescentes haud rugosi haud lenticellati remote aculeati, aculeis transverse sitis cuspidiformibus 3 mm. longis sursum subteretibus deorsum latere complanatis basi dilatatis 2-2 $\frac{1}{2}$  mm. latis rubescentibus, dense glanduloso-pilosi, pilis patentissimis  $1\frac{1}{2}$  mm. longis recurvis vel rectis apice glanduloso-globuligeris, globulis atrorubescentibus. Folia alterna membranaceo-chartacea vel membranacea 5-foliolata in ambitu ovata cum petiolis 10-12 cm. longa 5-6 cm. lata, foliolo terminali elongato-ovato apice gradatim acuminato ad summum aristato basi rotundato truncato utraque pagine villosa-pubescenti margine duplicato-serrulato, serrulis primariis 2 $\frac{1}{2}$  mm. latis 2 mm. longis ascendentibus apice cuspidatis latere superiore serrulis secundariis singulis latere inferiore serrulis secundariis duabus instructis, serrulis secundariis minutis apice cuspidiformibus, pagina in exsiccatò fusco-rubescenti, costis venisque supra profunde impressis subtus prominente elevatis, reticulis venularum supra impressis subtus prominente elevatis, venis lateralibus primariis utroque latere costæ 14-15 rectis vel subrectis subparallelis, mediis a costa angulo circ. 30° egressis, venis secundariis venarum primariorum inferimarum extrorsum 3 prominente elevatis distincte visis subrectis, venis secundariis cæteris indistinctis reticulatis, costa subtus remote aculeolata, aculeis

minutis paucis; foliis lateralibus oppositis subsessilibus vel brevissime petiolulatis cum foliolo terminali conformibus sed plus minus minoribus plus minus obliquis vel haud obliquis, petiolulo terminali 12 mm. longo, interjugis 25 mm. longis, petiolis communibus (a basi petiolusque ad jugam infimam) 40 mm. longis basi  $\pm$  dilatatis intus tenuiter sulcatis, cum petiolulo terminali et interjugis remote aculcolatis et dense glanduloso-pilosis, pilis patentissimis apice globuligeris rubescentibus, stipulis lanceolato-linearibus 8 mm. longis 1 mm. latis intus glabris extus glanduloso-pilosis e partibus dilatatis basis petiolorum oriundis ab axillis 2 mm. remotis. Flores ad apicem ramulorum racemosim dispositi vel terminales solitarii, racemis 2-3-floratis, pedicellis  $1\frac{1}{2}$  cm. longis dense setoso-pilosis, pilis minutis haud glandulosis cum setulis apice glanduliferis intermixtis, setulis  $1\frac{1}{2}$  mm. longis, pilis  $\frac{1}{2}$  mm. longis patentissimis. Calyx in flore apertienti extus densissime patentissime setuloso-pilosus, setulis 1-2 mm. longis apice globuliferis. Cupula calycis 6 mm. in diametro extus convexa sed ad centrum depressa extus glanduloso-setuloso-pilosa intus glaberrima concava sed ad centrum elevata ad receptaculum carpellorum abeuns ad centrum circa receptaculum pauce pilosa ad marginem annuliforme leviter elevatum stamina gerens, cicatricibus receptaculi carpellorum  $1\frac{1}{2}$  mm. in diametro. Calycis lobi triangulari-oblongi apice longissime lineari-caudati caudis exceptis 6 mm. longi 4 mm. lati apice acuti ad caudam abeuntes basi latissimi 4 mm. lati (sinibus inter lobos rotundatis) dorso extus partibus marginalibus exceptis dense glanduloso-setuloso-pilosi margine integri, partibus marginalibus haud setulosis simpliciter villosopilosis, caudis lineari-filiformibus 4 mm. longis medio  $\frac{1}{2}$  mm. in diametro subteretibus dorso convexis glanduloso-setulosis sursum glabris intus a basi usque ad apicem glabris medio intus profunde sulcatis fuscentibus; calycis lobis intus in basi areola triangulari et cauda glabris caeterum villosis. Petala ovato-oblonga 1 cm. longa 8 mm. lata apice rotundata basi brevissime unguiculato-angustata, partibus angustatis 1 cm. longis  $1\frac{1}{2}$  mm. latis basi  $1\frac{1}{2}$  mm. latis, margine subintegra extus hirsuta intus integra multinervia. Stamina  $\infty$ , ad marginem calycis cupulae inserta, filamentis in longitudine variabilibus longissimis  $5\frac{1}{2}$  mm. longis totis glabris filiformibus, antheris elongato-oblongis 1 mm. longis apice emarginatis basi 2-lobatis. Carpella numerosa; receptaculum cum carpellis numerosis globosum cum carpellis  $4\frac{1}{2}$  mm. in diametro sessile hirsutum,

carpellis semiovatis  $\frac{2}{3}$  mm. longis  $\frac{1}{3}$  mm. latis latere complanatis dorso et ventrali subcarinatis facie latere glabris dorso glanduloso-muricato-setulosis, setulis brevissimis  $\frac{1}{10}$  mm. longis apice globosis, carinis ventralibus sursum intus tenuiter recurvis ad stylum abeuntibus, stylis glabris  $1\frac{1}{2}$  mm. longis filiformibus apice clavato-obtusis apicem oblique stigmatiferis.

HAB. Akōchō: Konanausha, leg. S. SASAKI, Mart. 1910.


**Rubus fraxinifolius** HAYATA sp. nov. Suffrutex; rami et ramuli laeves haud rugosi haud lenticellati glabrati rubro-purpurascens remote aculeolati, aculeis triangularibus cuspidatis 3–4 mm. longis basi dilatatis  $2\frac{1}{2}$  mm. latis plus minus desuper recurvis, ramulis flexuosis foliatis, foliis a se 4–5 cm. remotis. Folia alterna chartacea in exsiccatō supra rubescentia plerumque glabra generaliter 5-foliolata cum petiolis 14–20 cm. longa 6–12 cm. lata, foliolo terminali ovato-lanceolato 7–9 cm. longo  $1\frac{1}{2}$ –3 cm. lato apice acuminato basi perfecte rotundato vel truncato-rotundato margine irregulariter serrato vel duplicato-serrato, serris apice cuspidato-aristatis ascendentibus, serris secundariis inter serras primarias 3–4, pagine supra subglabro vel ad costas venas tenuiter hirsuto subtus toto glaberrimo, costis venisque supra tenuiter impressis subtus distincte elevatis rubescentibus, costa subtus a basi usque ad prope apicem remote aculeolata, venis primariis lateralibus utroque latere costæ 9–10 subparallelis, mediis a costa angulo 30° egressis rectis apice ad apicem serrarum primariarum attingentibus, venis secundariis venarum infimarum extorsum 3–4 arcuato-ascendentibus, venulis tertiis inter venas primarias tenuissimis haud elevatis haud impressis obliquis sed cum costa angulo 90° egressis, reticulis venularum minutis supra haud subtus sub lente distincte visis, petiolulo terminali (i. e. a basi folioluli terminalis usque ad jugam foliolorum superiorum)  $1\frac{1}{2}$ –2 cm. longo intus profunde canaliculato hirsuto extus convexo glaberrimo, foliolis lateralibus oppositis totis in magnitudine æqualibus foliolo terminali conformibus plus minus obliquis in longitudine foliolum terminalem  $\frac{2}{3}$ -plo æquantibus, petiolulis lateralibus haud aculeolatis brevissimis 3 mm. longis; interjugis 3 cm. longis, petiolis communibus (i. e. ab axillis foliorum usque ad jugam infimum) 3–5 cm. longis cum interjugis petiolulo terminali toto intus profunde sulcatis glaberrimis remote aculeolatis, aculeis deorsum recurvis  $1\frac{1}{2}$  mm. in diametro sectionis, stipulis filiformi-linearibus 5 mm. longis  $\frac{1}{4}$  mm.-

1 mm. latis subglabris e petiolo oriundis ab axilla 3-4 mm. distantibus. Flores ad apicem ramulorum brevissimorum axillarum racemosim 1-2-siti. Ramuli floriferi brevissimi basi perulati, perulis castaneis 4-5, 3-5 mm. longis in ambitu obovatis apice trilobis vel 3-cuspidatis dorso apice hirsutis intus glabris, cupulibus triangularibus, pedicellis glabris 2-2½ cm. longis subglabris paucissime minute aculeolatis, aculeis 1½ mm. longis deorsum recurvis latere complanatis. Calyx extus cum pedicellis purpurascens. Calycis cupula 8 mm. in diametro dorso extus ad marginem 2½ mm. latum annulariter elevata extus ad centrum subito profunde excavata glabra glandulis lepidiformibus rotundatis fulvescentibus minutis parce dispersa; calycis lobis oblongo-triangularibus caudis exceptis 1 cm. longis 6-7 mm. latis, caudis filiformibus 4 mm. longis ½ mm. latis teretibus, lobis extus dorso (margine villosa-hirsuto excepto) glabris glandulis lepidiformibus dispersis intus villosa-hirsutis, caudis totis glabris intus sulcatis extus convexis; calycis cupula intus supra ad partem marginem 1½ mm. latum annulariter impressa concava glabra ad partem centalem 5 mm. in diametro subito elevata pilosa, cicatricibus stipitum receptaculorum 1½ mm. in diametro. Petala 5 alba rotundato-obovata 19 mm. longa 15 mm. lata apice rotundata basi late cuneata ad insertionem 1½ mm. lata margine subintegra utraque pagine glabra radiatim multinervia. Stamina ∞ ad partem marginalem ultra cupulam limborum calycis inserta, filamentis glabris, exterioribus longioribus 5-6 mm. longis glabris complanatis ½ mm. latis, antheris glabris ovato-oblongis 1 mm. longis apice connectivis plus minus apiculatis vel vix apiculatis basi 2-lobatis, connectivis ⅔ mm. longis ⅓ mm. latis fusco-coloratis. Receptaculum carpellorum subglobosum cum carpellis 7½ mm. longum 7 mm. latum carpellis exceptis ellipsoideum 6 mm. longum 3½ mm. latum subsessile ad basin 2 mm. latum plus minus villosum. Carpella glabra semi-oblonga plus quam ½ mm. longa, stylo glabro plus quam 1 mm. longo, stigmate obliquo. Pseudosyncarpium (fructus) ellipsoideum 1½ cm. longum 1 cm. latum, acheniis maturis obovatis vel ovatis latere complanatis margine exteriori convexo-recurvis margine interiori subrectis sursum rugosissimis fuscentibus deorsum laevibus fulvescentibus, stylis infra apicem e latere achenii oriundis, basi styli ab apicem achenii ⅓ mm. distant.

HAB. Mt. Arisan: inter Karapin et Suisharyō, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

This *Rubus* is generally found at the altitudes of 3000–4000–ft., but does not extend any higher than those of 4500 ft.

Near *Rubus fraxinifolius* Poir., but separable from it by the smaller leaves and nearly rounded pseudosyncarps. In *R. fraxinifolius*, the compound fruits are usually cylindrically oblong.

***Rubus parviaraliifolius*** HAYATA sp. nov. Suffrutex: rami leaves haud rugosi fulvo-rubrescentes tenuiter villosopubescentes remote aculeati, aculeis late triangularibus plus minus deorsum recurvis 3 mm. longis basi subito dilatatis ad basin 3–4 mm. latis latere valde compressis apice acutis rubescentibus, deorsum remote sursum dense glanduloso-pilosi, pilis rectangulariter patentibus circ. 1 mm. longis apice globuligeris, globulis atro-rubrescentibus. Folia a se circ. 7 cm.–4 cm. remota pinnata 3–5-foliolata in ambitu oblonga petiolis exceptis 15 cm. longa 12 cm. lata, foliolis lateralibus oppositis petiolulatis cum foliolo terminali simplicibus haud lobatis, foliolo terminali majore quam foliolis lateralibus rotundato-cordato 9–10 cm. longo 6–8 cm. lato apice acuminato vel cuspidato-acuminato basi rotundato vel leviter cordato margine irregulariter dentato-serrato, dentibus majoribus 2–3 mm. longis 4–5 mm. latis ascendentibus apice aristato-mucronatis latere plus minus -formibus, membranaceo in exsiccato fulvo-viridescenti supra parcissime brevissimeque hirsuto subtus molle villosio brevissimeque hirsuto, nervis venis venulisque supra haud elevatis plus minus impressis subtus elevatis, subtrinervio vel pinninervio, venis lateralibus primariis cum nervis lateralibus utroque latere 6–7, mediis a costa angulo 45° egressis subrectis ad apicem dentium attingentibus, venulis inter venas laterales transversis grosse reticulatis, venis lateralibus nervi lateralis vel venulis lateralibus venæ infimæ extrorsum 3–5 subrectis vel subarcuatis angulo acuto egressis ad apicem dentium attingentibus, costis venis venulisque flavo-stramineis breve villosis; foliolis lateralibus oppositis foliolo terminali minoribus conformibus 2–4; petiolulo folioli terminalis (a basi folioli terminalis usque ad jugum supremam) 2–3 cm. longo intus canaliculato cum costa folioli remote aculeato-villoso, petiolulis foliolorum lateralium 4 mm. longis intus canaliculatis dense villosis; jugis foliolorum lateralium superioribus et inferioribus in magnitudine æqualibus conformibus  $2\frac{1}{2}$ –4 cm. remotis; petiolis communibus (ab axilla usque ad jugum infimam) 3–5 cm. longis intus subplanis vel subcanaliculatis extus



convexis remote aculeolatis villosis, stipulis minutis a petiolo oriundis ab axilla 3 mm. remotis linearibus 2-5 mm. longis  $\frac{1}{4}$ - $\frac{1}{3}$  mm. latis hirsutis. Flores paniculati, paniculis terminalibus 10 cm. longis 5-6 cm. latis, ramis divaricatis, inferioribus generaliter paucifloratis longioribus 4 cm. longis 2-3-floratis, superioribus simplicibus 1-floratis; rhachis cum pedunculis patento-hirsuta præterea glanduloso-setulosa, setulis rectis longioribus 1 mm. longis divaricatissimis apice peltas glandulosas fuscentes gerentibus, pedicellis ultimis  $\frac{1}{2}$  cm. longis basi bracteis singulis instructis, bracteis lineari-triangularibus vel linearibus 7 mm. longis extus glanduloso-setulosis et pilosis intus pilosis; medio bracteolis duabus alternis instructis. Flores haud patentes semi-clausi. Calyx subcampanulatus extus glanduloso-setosus et pilosus; cupula 5 mm. in diametro extus dorso convexa ad centrum plana, lobis oblongo-triangularibus erectis haud patentibus 6 mm. longis 4 mm. latis apice sursum triangulari-acutis ad summum subito caudatis (caudis  $1\frac{1}{2}$  mm. longis apice glabris subobtusis), intus densissime piloso-villosis; cupula intus subplana vel leviter concava glabra ad centrum plus minus pilosa, cicatricibus basis receptaculorum  $1\frac{1}{2}$  mm. in diametro. Petala persistentia calycis lobis inclusa unguiculata, lamina quadrangulati-rotundata unguibus exceptis  $2\frac{1}{2}$  mm. longa  $3\frac{1}{2}$  mm. lata apice rotundata basi truncata margine (basi integro excepto) denticulato-crenata utraque pagine glabra, unguibus linearibus  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis utraque pagine hirsutis basi ad insertionem  $\frac{2}{3}$  mm. latis. Stamina  $\infty$  ad marginem cupulae inserta glabra, filamentis longioribus 3 mm. longis complanatis  $\frac{1}{2}$  mm. latis sursum angustioribus, antheris rotundato-cordatis  $\frac{2}{3}$  mm. longis apice leviter basi alte lobatis, connectivis fuscentibus. Receptaculum semiglobosum 2 mm. in diametro 1 mm. altum pilosum; carpella semioblonga  $\frac{2}{3}$  mm. longa complanata plus quam  $\frac{1}{3}$  mm. lata pilosa apice oblique acuta ad stylum abeuntia, stylo deorsum piloso sursum glabro  $2\frac{1}{2}$  mm. longo apice obtuso, stigmate subterminali 2-lobo.

HAB. Tappansha, leg. S. SASAKI, Mai. 1912 (fl.).

**Rubus adenotrichopodus** HAYATA sp. nov. Suffrutex; ramuli subrecti haud vel vix flexuosi sublaeves vel tenuiter longitudinaliter striati in exsiccato rubro-purpurascens glabri remote aculeolati, aculeis remotis minutis late triangularibus complanatis apice cuspidato-acutis basi dilatatis 1 mm. longis basi

totiusque latis apice plus minus deorsum recurvis. Folia alterna membranacea distantia a se  $3\frac{1}{2}$  cm. remota simplicia ovato-oblonga vel angustato-oblonga vel oblongo-linearia  $6\frac{1}{2}$ –9 cm. longa 3– $3\frac{1}{2}$  cm. lata apice gradatim acuminata acuminatissima vel caudato-acuminatissima basi perfecte truncata vel leviter cordata margine duplicato-serrata, serris primariis mediis triangulari-acutis apice cuspidato-acutis, latere superiore 2 mm. longo serra secundaria una instructo latere inferiore 8–10 mm. longo serris secundariis 3–5 instructo, serris secundariis minutis 1 mm. longis totiusque latis apice cuspidiforme acutis leviter deorsum recurvis ascendentibus, pagine utraque glabra sed supra plus minus scabriuscula in exsiccatō viridi-fulvescentia subtus plus minus pallida vel subconcolora 3–5-nervia, nervis venis supra tenuiter impressis subtus tenuiter elevatis, supra ad costas venas tenuiter hirsuta subtus glabra, venis lateralibus primariis costæ centralis utroque latere costæ 8–9, mediis a costa angulo  $45^\circ$  egressis rectissimis apice ad apicem serrarum primariarum attingentibus rubro-coloratis, venulis reticulatis subtus distincte visis sed haud vel vix elevatis, costis lateralibus a costa centrali angulo  $45^\circ$  egressis rectis ad apicem serrarum primariarum attingentibus, venis lateralibus primariis costarum lateralium extrorsum 2–3, venis infimis (vel costis infimis) extrorsum 3–3-venuliferis, petiolis 12 mm. longis intus sulcatis pubescentibus extus glabris cum costa centrali remote aculeolatis, stipulis ad axillas e ramulo oriundis ovato-lanceolatis 7 mm. longis  $1\frac{1}{2}$  mm. latis apice acuminatis intus glabris extus pubescentibus. Flores racemosim dispositi, racemis terminalibus 6 cm. longis 5–6-floratis; rhachis racemorum gracilis cum pedicellis minutissime paucissime pubescens densiuscule setulosa, setulis 1–2 mm. longis rectis angulo recto divaricatis teretibus apice glanduloso-globuliferis, pedicellis ultimis 1–2 cm. longis basi bracteis singulis bracteolis duabus instructis, bracteis lanceolato-linearibus 7–10 mm. longis extus minute glanduloso-setulosi et pubescentibus intus pubescentibus margine paucissime serrulatis, bracteolis minoribus, interdum pedicellis medio bracteolis singulis instructis. Flores apertientes non visi. Alabastrum florum globosum apice calycis lobis apiculatum. Calycis lobi oblongo-triangulares extus brevissime villosi patentissime glanduloso-setulosi apice longe caudati (caudis teretibus) intus partibus basilaribus glabris exceptis brevissime villosi; calycis cupula 6 mm. in diametro leviter concava partibus marginalibus 1 mm. latis glabris partibus centralibus 1 mm. latis densis-

sime longissime seriseo-pilosis, receptaculo  $1\frac{1}{2}$  mm. in diametro leviter elevato piloso. Petala late rotundata apice rotundata basi brevissime unguiculata, unguibus  $\frac{1}{2}$  mm. longis 1 mm. latis, margine integra utraque pagine prope basin tenuiter hirsuta. Stamina ad partem marginalem cupulæ calycis inserta, filamentis glabris, antheris oblongis; carpellis glabris, stylis glabris.

HAB. Mt. Shichiseitonzan, leg. Y. SHIMADA, Mart. 1911.

Near *Rubus Swinhœi* HANCE, but differs from it in having thinner membranaceous leaves which are nearly glabrous on both sides. In *R. Swinhœi* HANCE, the leaves are usually densely coated on the under surface.

**Rubus piptopetalus** HAYATA in KOIDZUMI Conspect. Rosac. Jap. in Journ. Coll. Sci. Imp. Univ. Tokyō XXXVI.-2, p. 153. Suffrutex; rami et ramuli flexuosi vel subrecti dense glanduloso-hirsuti, pilis patentissimis apice globuliferis, globulis atro-rubrescentibus, remote aculeati, aculeis latere complanatis linearitriangularibus 4-5 mm. longis basi 2 mm. latis transverse sitis vix vel haud recurvis pallido-rubrescentibus. Folia alterna remote sita cum petiolis 9-17 cm. longa 6-11 cm. lata, superiora 3-, inferiora 7-foliolata, foliolo terminali 4-6 cm. longo 2-3 cm. lato ovato vel oblongo-ovato apice acuto vel triangulari-acuto ad summum acutissimo basi obtusissimo vel subrotundato margine duplicato dentato, dentibus primariis mediis 3 mm. latis 1 mm. longis latere superiore dentibus secundariis unicus latere inferiore dentibus secundariis duabus instructis apice aristato-cuspidato-acutis ascendentibus haud recurvatis, utraque pagine dense villosopubescenti membranaceo, costis venispue supra haud vel vix impressis subtus tenuiter elevatis, venis lateralibus primariis utroque latere costæ 10-11, mediis a costa angulo 30° egressis subrectis sursum leviter deorsum recurvis apice ad apicem dentium primariorum attingentibus a se 3 mm. distantibus, costa subtus remote aculeolata, foliolis lateralibus oppositis subsessilibus vel brevissime petiolulatis cum foliolo terminali conformibus sed minoribus, iis superioribus minimis, iis inferioribus majoribus sed quam foliolo terminali minoribus, petiolulo terminali brevi  $\frac{1}{10}$ -plo foliolum terminale in longitudine æquant, interjugis in longitudine foliolum superius laterale subæquantibus vel ea brevioribus, petiolis communibus in longitudine foliolum terminale æquantibus cum interjugis petiolulo terminalique intus angustis sine sulcatis remote aculeolatis glanduloso-pilosis, aculeis deorsum recurvis, basi

plus minus dilatatis, stipulis e petiolo oriundis 5 mm. longis 1 mm. latis lineari-lanceolatis apice acuminatis intus glabris extus dense hirsutis. Flores ad apicem ramulorum superiorum terminales solitarii vel cymosum 1-2 dispositi; pedicelli ultimi 2 cm. longi setulosi, setulis tenuissimis patentissimis apice glanduliferis, dense villosi. Calycis cupula 9 mm. in diametro dorso subplana margine subconvexa sed versus centrum gradatim tenuissime concava dorso densissime vilosa setulosa, setulis piliformibus plus minus glanduliferis, calycis lobis patentissimis elongato-triangularibus cauda excepta 9 mm. longis 6 mm. latis apice longe caudatis, caudis 5 mm. longis  $\frac{1}{2}$  mm. latis extus intusque villosis, calycis lobis dorso extus villosis setulosis, setulis tenuissimis, intus parte basilari excepta villosis; cupula intus leviter concavo-subplana glabra sed ad centrum leviter elevata circum stipitem receptaculi pilosa, cicatricibus stipitis receptaculi 2 mm. in diametro. Petala late ovato-rotundata 14 mm. longa totiusque lata apice obtusissima vel rotundata ad extremitatem  $\frac{1}{2}$  mm. latam contracta margine integra minute hirsuta vel ciliolata utraque pagine tenuiter hirsuta radiatim nervata, venis venulis reticulatis. Stamina  $\infty$  ad marginem cupulae inserta, filamentis exterioribus 7 mm. longis complanatis  $\frac{1}{2}$  mm. latis glabris 1-nerviis, antheris oblongis  $1\frac{1}{4}$  mm. longis apice emarginatis basi lobatis. Receptaculum elongato-ellipticum 4 mm. longum 2 mm. latum ad basin 2 mm. latum pilosum, carpellis lineari-obovoideo-semi-oblongis latere complanatis  $\frac{3}{4}$  mm. longis dorso sursum pilis apice glanduloso-globuligeris 5-6 instructis apice latere subito acuta ad stylum abeuntibus, stylis glabris  $1\frac{2}{3}$  mm. longis apice truncatis stigmatosis; pendosyncarpium globosum 8-9 mm. in diametro, acheniis semi-rotundatis 2 mm. longis  $1\frac{1}{2}$  mm. latis in sectione octantiformibus latere interiore acutis latere exteriori rotundatis et plus minus carinatis apice rotundatis basi cuneatis brevissime stipitatis (stipitibus  $\frac{1}{3}$  mm. longis latere complanatis) dorso sursum fusco-purpurascens pilis glanduliferis parce obtectis.

*Rubus tagallus* MATSUM. (non CHAM. et SCHL.) in MATSUM. et HAYATA Enum Pl. Formos. p. 123.

HAB. Heichōshō, leg. S. NAGASAWA, Feb. 1904 (No. 345 typus!); Taihoku, leg. T. MAKINO, Nov. 1896; Tamsui; Gōkwanzan, leg. U. MORI, Feb. 1910.

**Rubus parvifraxinifolius** HAYATA sp. nov. Suffrutex; ramuli rubro-purpurascens glabri flexuosi glaberrimi remote aculeati laeves, aculeis subulato-

triangularibus 3 mm. longis latere complanatis basi dilatatis 1 mm. latis transverse patentibus plus minus recurvis. Folia alterna a se 4 cm. remota 5-foliolata oblonga in ambitu cum petiolis 10 cm. longa 5 cm. lata, foliolo terminali oblongo 4 cm. longo 2 cm. lato obtuso-acuto basi acuto margine duplicato-serrato, serris primariis latere superiore  $1\frac{1}{2}$  mm. longis laud serrulatis latere inferiore 5 mm. longis serrulis 3 instructis, serrulis minutis, in exsiccato pagine supra fulvo-rubescenti subtus pallidiore utraque pagine parvissime hirsuto vel subglabrato, costis venis lateralibusque supra impressis subtus prominente distincteque elevatis, costa subtus remote aculeolata, venis lateralibus primariis utroque latere costæ 9-10, mediis a costa angulo  $30^\circ$  egressis rectissimis ad apicem serrarum primariarum attingentibus a se 3 mm. distantibus, venulis inter venas laterales oblique sitis obscuris indistincte reticulatis, foliolis lateralibus oppositis foliolo terminali conformibus sed vix minoribus plus minus obliquis, interjugis 2 cm. longis, petiolulo terminali (a basi folioli terminalis usque ad jugam superiorem foliolorum laterarium) 6 mm. longo intus canaliculato, petiolulis lateralibus 2 mm. longis hirsutis, petiolis communibus (ab axillis usque ad jugam infimam) 2 cm. longis subglabris intus canaliculatis cum interjugis remote aculeolatis, stipulis a petiolo oriundis ab axillis 3 mm. distantibus filiformibus vel filiforme-linearibus. Flores ad apicem ramulorum terminales solitarii vel racemose dispositi, racemis 2-3-floriferis, pedicellis ultimis circ. 2 cm. longis glabris basi bracteis singulis instructis, bracteis lineari-lanceolatis 5-7 mm. longis minus 1 mm. latis glabris apice acuminatissimis, pedicellis medio interdum bracteolis alternis duabus instructis, bracteolis lineari-lanceolatis 4-5 mm. longis margine 1-2 serrulis instructis. Cupula calycis  $5\frac{1}{2}$ -6 mm. in diametro dorso extus versus marginem subconvexa sed versus centrum subconcava extus glabra parvissime glandulis punctiformibus lepidiformibusque conspersa, lobis oblongo-triangularibus  $4\frac{1}{2}$  mm. latis 8 mm. longis (caudis exceptis) apice longissime caudato-acuminatis, caudis 4 mm. longis medio  $\frac{1}{2}$  mm. latis extus intusque glabris intus tenuiter sulcatis, lobis dorso subglabris vel pilis fulvescentibus et glandulis lepidiformibus parvissime conspersis basi plus minus contractis vel haud contractis (sinibus inter lobos acutis) intus villosopubescentibus; cupula calycis intus ad partem marginalem  $1\frac{1}{2}$  mm. latam glabra concava, ad partem centralem 3 mm. in diametro densissime pilosa convexa, cicatricibus stipitum

receptaculorum 1 mm. in diametro; lobis calycis in flore apertienti patentissimis. Petala oblongo-rotundata 9 mm. longa 7-8 mm. lata apice rotundata basi obtusa ad extremitatem ad unguem brevissimum contracta, unguibus brevissimis 1 mm. longis ad basin  $1\frac{1}{4}$  mm. latis, margine basibus exceptis crenulata versus basin integra extus plus intus minus hirtella. Stamina  $\infty$  ad marginem calycis cupule inserta, filamentis in longitudine variabilibus, longioribus  $3\frac{1}{2}$  mm. longis complanatis subteretibus apice subulato-angustatis  $\frac{1}{4}$  mm. latis, antheris  $\frac{3}{8}$  mm. longis  $\frac{1}{2}$  mm. latis apice marginatis basi lobatis. Receptaculum carpellorum ellipsoideum 3 mm. longum  $1\frac{1}{2}$  mm. latum glabrum parce pilosum, carpellis glabris vel sursum pilis 2-3 conspersis vel setulis glanduliferis 1-2 instructis sub microscopio sursum elevato-reticulatis deorsum lævibus semi-obovoideis  $\frac{1}{2}$  mm. longis apice ad apicem oblique acutis ad stylum glabrum 1 mm. longum abeuntibus; stigma obliquum 2-lobatum.

HAB. Kwarenkō, leg. Y. SHIMADA, Jan. 1913.

Near *R. fraxinifolius* POIR., but differs from that species in having much smaller leaves.

**Rubus parvirosæfolius** HAYATA sp. nov. Suffrutex; rami et ramuli subrecti vel leviter flexuosi in exsiccatō fuscentes tenuiter pubescentes remote aculeolati, aculeolis triangulari-cuspidiformibus deorsum valde recurvis  $2\frac{1}{2}$  mm. longis basi dilatatis  $2\frac{1}{2}$  mm. latis latere tenuiter complanatis. Folia alterna se 3-4 cm. remota 5-foliolata in ambitu ovata cum petiolis 8 cm. longa 3 cm. lata, foliolo terminali ovato-oblonga vel ovato-lanceolata apice gradatim acuminato ad summum aristato-acuminato 5 cm. longo 17 mm. lato basi obtusissimo margine duplicato-serrato, serris mediis primariis 3 mm. latis  $2\frac{1}{2}$  mm. longis apice cuspidato-acutis latere superiore serris secundariis singulis latere inferiore serris secundariis duabus instructis, serris secundariis minutis ascendentibus sursum recurvis cuspidiformibus 1 mm. longis, venis primariis lateralibus utroque costæ latere 13-14 subparallelis, mediis a costa angulo 40° egressis subrectis vel rectis ad apicem serrarum primariarum attingentibus venulis inter venas transverse reticulatis, reticulis minutis sub lente distincte visis, costis venisque supra tenuiter impressis subtus prominente elevatis, pagina membranacea supra fuscenti subtus plus minus pallida supra minus subtus plus hirsuta subtus parvisime glanduloso-punctata, petiolulo terminali 4 mm. longo, foliolis late-

ralibus oppositis sessilibus vel brevissime petiolulatis minoribus dimidium folioli terminalis in longitudine æquantibus vel quam dimidio brevioribus ovatis minus acutis basi subrotundatis cæterum cum foliolo terminali conformibus, interjugis 1 cm. longis, petiolis communibus  $1\frac{1}{2}$  cm. longis, petiolis cum interjugis petiolulo terminali et costa foliolorum remote aculeolatis molle adpresseque hirsutis angustissime sulcatis minute glanduloso-punctatis, punctis flavis, stipulis lineari-filiformibus 5 mm. longis  $\frac{1}{4}$  mm. latis apice acuminatis extus hirsutis intus glabris extus glanduloso-punctatis basi petioli oriendis ab axilla  $1-\frac{1}{2}$  mm. distantibus. Flores ad apicem ramulorum terminalium solitarii vel cymose dispositi, cymis 2-3-floratis, pedicellis 1-2 cm. longis dense pubescentibus remote minuteque aculeolatis glandulis lepidiformibus dense conspersis, bracteis et bracteolis linearibus minutis. Calycis cupula dorso subplana leviter convexa 4 mm. in diametro dorso patentissime hirsuta glandulis lepidiformibus dense conspersa, lobis longissime triangularibus 6 mm. longis (caudis exceptis) basi  $3\frac{1}{2}$  mm. latis apice gradatim longissime caudatis, caudis 5 mm. longis extus glanduliferis patento-hirsutis intus subglabris tenuiter canaliculatis, lobis intus cauda et parte basilari glabra excepta depresso-villosis; cupula calycis ad partem marginalem  $1\frac{1}{2}$  mm. latam glabra concava, sed ad partem centralem  $2\frac{1}{2}$  mm. in diametro patentissime pilosa, cicatricibus stipitum receptaculorum  $\frac{1}{2}$  mm. in diametro. Petala oblongo-rotundata  $8\frac{1}{2}$  mm. longa 7 mm. lata apice rotundata basi late cuneata ad extremitatem subito acuta ad insertionem  $\frac{2}{3}$  mm. lata margine subintegra extus plus intus minus hirtella. Stamina  $\infty$  ad marginem cupulae calycis inserta, filamentis variabilibus, longioribus 5 mm. longis  $\frac{1}{2}$  mm. latis glabris, antheris oblongo-rotundatis  $\frac{1}{2}$  mm. longis utrinque bilobatis, connectivis dorso convexis latioribus. Receptaculum carpellorum elongato-ellipticum  $2\frac{1}{2}$  mm. longum  $1\frac{1}{4}$  mm. latum parce pilosum vel haud pilosum, stipite 1 mm. longo piloso, carpellis semi-obovatis  $\frac{2}{3}$  mm. longis sursum glandula globuliformi flava stipitata dorso conspersis glabris apice oblique acutis ad stylum glabrum recurvum abeuntibus; stigmata obliqua biloba. Achenia in exsiccatō fusco-rubescencia semi-obovoideo-oblonga  $1\frac{1}{2}$  mm. longa  $\frac{2}{3}$  mm. lata rugulosa sub apice latere interiore stylum emittentia.

*Rubus roseifolius* SMITH. subsp. *Maximowiczii* HAYATA (non FOCKE) in HAYATA Ic. Pl. Formos. III. p. 93.

Near *R. roseifolius* Sm., but separable from it in having much smaller flowers with glandularly dotted calyx. Remarkable for the leaves and the petioles dispersed with glandular dots.

HAB. Mt. Arisan, inter Funkiko et Taroyen, leg. TAKEO ITÔ et B. HAYATA Mart. 1914.

**Rubus parvipingens** HAYATA sp. nov. Suffrutex scandentissimus; ramis et ramulisque leviter flexuosis sublaevibus vel longitudinaliter tenuissime striatis in exsiccatō purpureo-fulvescentibus haud hirsutis glaberrimis vel subglabris remote aculeolatis, aculeis lineari-triangularibus longissimis 8 mm. longis valde complanatis longe cuspidiformibus basi elongato-triangulari-dilatatis ad basin 4 mm. latis rubescentibus versus apicem linearibus subrectis transverse sitis. Ramuli hornotini florigeri e ramo alternatim oriundi generaliter 1-florati brevissimi 2-4 cm. longi basi dense ut videntur quasiverticillatim foliati flore solitario terminales, perulis (deciduis?) haud visis. Folia alterna basi ramulorum densissime quasiverticillatim disposita membranacea inferiora minora, superiora majora cum petiolis 2-6 cm. longa 1-3 cm. lata in ambitu oblongo-ovata 5-7-foliolata toto tenuiter hirsuta, foliolo terminali oblongo-ovato 8-25 mm. longo 5-10 mm. lato apice gradatim acuminato basi obtuso vel rotundato margine duplicato-serrato-dentato, serris primariis (in specimine majore) 2 mm. latis  $1\frac{1}{2}$  mm. longis apice cuspidato-acutis latere superiore serris secundariis singulis latere inferiore serris secundariis duabus instructis argute acutis acutissimis sursum recurvis ascendentibus, ad basin integro, costis venisque supra tenuiter impressis subtus elevatis, venis lateralibus primariis utroque latere 9-8 subparallelis rectissimis vel subrectis, mediis a costa angulo  $30^\circ$  egressis ad apicem serrarum primariarum attingentibus a se  $1\frac{1}{2}$ -2 mm. distantibus, venulis inter venas primarias transverse sitis haud elevatis sed distincte coloratis et visis, pagine in exsiccatō supra fuscenti subtus pallidiore, costa subtus remote aculeolata, foliolo laterali subopposito vel subalterno foliolo terminali minore, infimo minimo dimidium folioli terminalis aequanti basi generaliter truncato plus minus obliquo interdum aequilato cæterum cum foliolo terminali conformi, petiolulis foliorum lateralium brevissimis 1 mm. longis hirsutis, petiolulo folioli terminalis (in specimine majore) 5 mm. longo, interjugis 8 mm. longis, petiolis communibus (ab axillis usque ad foliolum infimum) 12 mm. longis cum petiolulo terminali,



interjugisque toto profunde sulcatis hirsutis pilis glanduliferis aculeisque remote instructis basi valde dilatatis cum stipulis plus minus connatis, stipulis e basi petioli oriundis, iis folii inferioris majoribus oblongo-lanceolatis 6 mm. longis  $1\frac{1}{2}$  mm. latis apice acuminatis latere interiore cum petiolis usque 2 mm. connatis 1-nerviis extus hirsutis intus glabris margine ciliatis membranaceis, iis folii superioris minoribus linearibus longioribus angustioribus. Flores ad apicem ramulorum lateralium solitarii interdum racemosum dispositi, racemis 1-2-floratis, pedicellis 1-2 cm. longis subglabris remote aculeolatis et setulis glanduliferis minutis  $\frac{1}{2}$  mm. longis parcissime dispersis. Cupula calycis 7-8 mm. in diametro dorso glaberrima subconvexa sed versus centrum leviter concava, lobis triangularibus apice longe caudatis (caudis exceptis) 6 mm. longis 5 mm. latis, caudis linearibus 3 mm. longis medio  $\frac{1}{3}$  mm. latis, lobis dorso partibus tomentosis exceptis glabris intus caudis et partibus basilaribus exceptis depresso-villoso-hirsutis; cupula calycis intus ad partem marginalem 3 mm. latam concava glabra ad partem contralem patento-pilosa, cicatricibus stipitum receptaculorum 1-2 mm. in diametro. Petala albo-viridia rotundata 9 mm. longa totiusque lata apice truncato-rotundata basi obtuso-rotundata ad insertionem 1 mm. lata margine integra extus plus intus minus hirtella. Stamina  $\infty$  ad marginem cupulae calycis inserta, filamentis glabris in longitudine variabilibus, longioribus 5 mm. longis subtriquetris  $\frac{1}{3}$  mm. latis apice angustatis, antheris quadrangulati-linearibus  $1\frac{1}{3}$  mm. longis  $\frac{1}{2}$  mm. latis apice emarginatis basi 2-lobatis. Receptaculum carpellorum conico-globosum 2 mm. longum totiusque latum apice pilosum; carpellis haud pilosis subglabris levibus dorso extus glandulis minutis plus minus stipitatis parce dispersis, stylis  $1\frac{1}{2}$  mm. longis glabris, stigmatibus terminalibus 2-lobatis.

HAB. Mt. Arisan, Nimandaira ad 7000 ped. alt., leg. B. HAYATA et TAKEO IRÔ, Aprili. 1914.

Near *Rubus pungens* CAMB. var. *Oldhami* MAXIM., but differs from it in its habit, in its smaller leaves and in the much densely aculeate calyx. I found the present plant forming unpenetrable bushes in a clearing in the Arisan over an altitude of 7000 ft., in the spring of the year 1914.

**Rubus conduplicatus** DUTHIE; HAYATA Ic. Pl. Formos. p. 224, t. 24. Flores campanulati. Petala alba valde extrorse reflexa; sepala viridia.

HAB. Mt. Arisan, inter Funkiko et Taroyen, leg. B. HAYATA, Mart. 1914.

**Rubus hirsuto-pungens** HAYATA n. n. *Rubus rosafolius* SM. var. *hirsutus* HAYATA Fl. Mont. Formos. p. 81.

HAB. Mt. Morrison, ad 12000 ped. alt., leg. U. MORI, Oct. 1905, (No. 2264).

Very near *Rubus parvi-pungens* HAYATA, but distinguishable from that species in the quite different habit, in the sepals with long linear tails and in the pubescent pedicels.

**Rubus Kawakamii** HAYATA Mater. Fl. Formos. p. 91: Ic. Pl. Formos. I. p. 227, t. 26. Descriptio auctata: Calyx cinereo-purpurascens setulis purpurascensibus dense conspersus. Petala alba vel leviter purpurascens. Petala alba vel leviter purpurascens.

HAB. Mt. Arisan, inter Funkiko et Taroyen, leg. B. HAYATA, Aprili 1914, (Fl.).

**Rubus Thunbergii** S. et Z.

HAB. Fokien: Uschisan, leg. S. NAGASAWA, Feb. 1909 (No. 153).

Compared with a specimen so labelled in the herbarium at Tōkyō.

### *Rosa* LINN.

**Rosa Pricei** HAYATA sp. nov. Frutex. Ramuli teretes remote aculeolati subglabri vel parce setulosi læves vel longitudinaliter rugulosi fuscenti-fulvi, setulis transverse sitis minutis  $\frac{1}{3}$  mm. longis, aculeis cuspidato-triangularibus transverse sitis rubescentibus  $1\frac{1}{2}$  mm. longis apice cuspidiformibus plus minus deorsum recurvis basi late triangulari-dilatatis latere complanatis basi circ. 2 mm. latis. Folia alterna a se circ. 3 cm. remota generaliter 7-foliolata in ambitu oblongo-obovata vel rhomboideo-oblonga cum petiolis 4 cm. longa 2 cm. lata apice acuta in ambitu obtusa, foliolo terminali tenuiter coriaceo ovato vel oblongo  $1\frac{1}{2}$  cm. longo 8 mm. lato apice triangulari-acuto ad extremitatem obtuso ad summum extremitatis serra una acuta instructo basi late obtriangulari-obtuso margine serrulato, serrulis subæquiformibus subtriangularibus apice acutis ascendentibus plus minus latere recurvis  $\frac{2}{3}$  mm. latis  $\frac{1}{2}$  mm. longis, margine deorsum tenuissime recurvo prope basin integro chartaceo vel chartaceo-coriaceo in exsiccatō supra fuscenti subtus pallido utraque pagine glabro, costa supra impressa subtus elevata, venis venulis et reticulatis venularum supra elevatis visis subtus minus elevatis sub lente distincte visis, venis lateralibus primariis utroque latere 7-8 parallelis, mediis a costa angulo 50° egressis rectis prope

marginem furcato-ramosis, ramis venarum ad apicem serrularum attingentibus, costa subtus aculeis minutis singulis vel duobus instructis, petiolulo terminali 5 mm. longo in longitudine  $\frac{1}{3}$ -plo foliolum terminale æquantibus, foliolis lateralibus oppositis, jugis a se 5-6 mm. distantibus sessilibus, superioribus majoribus in longitudine foliolum terminale  $\frac{2}{3}$ -plo æquantibus oblongis apice obtusis, foliolis inferioribus gradatim minoribus, infimis  $\frac{1}{3}$  plo in longitudine foliolum terminale æquantibus 5 mm. longis obovatis apice truncatis cæterum cum foliolo terminali conformibus, petiolis communibus (ab axillis usque ad jugam infimam) 8 mm. longis quam petiolulo terminali longioribus, interjugis petiolo terminali æquilongis, totis intus sulcatis glabris angustissime alatis extus remote paucissime minute aculeolatis, aculeis singulis vel duobus, stipulis linearibus latere inferiore se connatis 4 mm. longis 1 mm. latis apice caudato-acuminatis glabris margine ciliato-serrulatis (serrulis ascendentibus recurvatis) apice sursum a petiolo liberis, partibus liberis 1-2 mm. longis. Flores cymosi, cymis ad apicem ramulorum terminalibus  $2\frac{1}{2}$  cm. longis totiusque latis, pedunculis 8 mm. longis glabris, bracteis singulis et bracteolis duabus sub pedicello singulis, bracteis cuspidato-ovatis cum cuspidibus 5 mm. longis  $2\frac{1}{2}$  mm. latis vel angustioribus margine glanduloso-ciliatis extus subtus medio elevato-costatis, cuspidibus teretibus 2 mm. longis, bracteolis cuspidato-triangularibus cum cuspidibus  $1\frac{1}{2}$  mm. longis basi 1 mm. latis margine pilosis dorso subtus carinatis, cuspidibus  $\frac{1}{2}$  mm. longis, pedicellis 1 cm. longis rectis cum calyce dense glanduloso-setulosis simul pubescentibus, setulis horizontaliter patentibus  $\frac{1}{3}$  mm. longis apice elevatis vel globuliferis. Calyx minute glanduloso-setulosus et simul pubescens; calycis tubus oblongo-obconicus  $2\frac{1}{2}$  mm. longus  $2\frac{3}{4}$  mm. latus, lobis 5 deorsum reflexis lanceolatis 7 mm. longis 2 mm. latis apice longissime acuminatis basi leviter contractis extus setuloso-glandulosis simul paucissime pubescentibus, intus brevissime villosis crassiusculis sed partibus apicalibus glabris margine integerrimis interiore tenuissime recurvis. Petala 5 obovato-cuneata 8 mm. longa 8-9 mm. lata apice emarginata vel truncata basi cuneata ad extremitatem truncata, partibus truncatis 2 mm. latis, ad insertionem 1 mm. lata margine subintegra sed prope apicem suberosa tenuia utraque facie glabra vel subglabra (alba?) vel extus basi pubescentia. Stamina  $\infty$ , filamentis filiformibus minus quam 3 mm. longis glaberrimis, antheris ovato-oblongis minus quam

1 mm. longis  $\frac{3}{2}$  mm. latis basi plus apice minus lobatis. Discus ad orem calycis tubi situs coniformis 1 mm. longus stylos firme amplexans; styli circ. 10 supra discum  $3\frac{1}{2}$  mm. excelsi toto longitudine connati albo-pilosi apice stigmatibus terminati; stigmatibus singulis peltiformibus, peltis rotundatis  $\frac{1}{3}$  mm. in diametro; styli infra discum liberi. Carpella 10 libera semi-ovato-lanceolata latere complanata latere glabra dorso dense strigoso-pilosa.

HAB. Tappansha, Holisha, ad 6000 ped. alt., Sept. 1912, leg. R. PRICE.

Near *Rosa serrata* ROLFE, but distinguishable from it by the much smaller flowers and serrulate stipules.

***Rosa moschata* MILL.**; Hook. f. Fl. Brit. Ind. II. p. 367; HEMSL. Ind. Fl. Sin. I. p. 252; SCHN. Handb. Laubholz. I. p. 542, fig. 319, m—n<sup>2</sup>.

*Rosa Brunonii* LINDL. Bot. Mag. t. 4030.

HAB. Mt. Arisan: prope Funkiko, leg. TAKEO ITÔ et B. HAYATA, Mart. 1914.

Our plant accords exactly with the descriptions and figures given in the above cited literature. As the species exists also in Japan, there can be no dispute about our plant's being referable to *R. moschata*. The following description is drawn from our specimens.

Frutex scandentissimus ad truncum arboris scandens, rami ramulique a summo trunci arboris verticaliter penduli; rami defoliati teretes fusco-viridescens longitudinaliter multi-sulcato-striati haud lenticellati remote vel densiuscule aculeati, aculeis late triangularibus latere complanatis 3 mm. longis basi 7 mm. latis apice cuspidiformibus descendens apice deorsum recurvis, cicatricibus aculeorum elongato-ellipticis 7 mm. longis 2 mm. latis, ramis plus minus flexuosis. Ramuli foliiferi et floriferi haud aculeati circ. 20 cm. longi a ramo angulo subrecto divaricati alternatim foliiferi apice inflorescentia terminati. Folia alterna a se circ. 3 cm. distantia 5–6 foliolata chartaceo-membranacea supra in exsiccato fuscentia subtus pallidiora supra in vivo nitida glabra subtus subglabra in ambitu ovata 12–16 cm. longa 8–16 cm. lata, foliolo terminali oblongo vel oblongo-ovato 6–8 cm. longo  $2\frac{1}{2}$ – $3\frac{1}{2}$  cm. lato apice acuminato vel plus minus caudato-acuminato ad summum acuminatissimo basi obtusissimo-rotundato vel tenuissime cordato, margine medio sursum regulariter serrulato, (serrulis cuspidato-triangularibus ascendens apice recurvis vel incurvis), prope basin sub-

integro, costa supra tenuiter impressa subtus elevata, venis primariis supra vix subtus distincte elevatis, venulis reticulatis utroque tenuissime elevatis, reticulis minutissimis sub luce transversa distincte visis, venis lateralibus primariis utroque latere costae 10-12, mediis a costa angulo  $45^\circ$  egressis subrectis usque ad prope apicem haud ramosis versus apicem subito arcuatis cum eis superioribus junctis, venulis secundariis ad apicem serrularum attingentibus, petiolulo terminali 18 mm. longo glabro intus sulcato, foliolis lateralibus oppositis sessilibus cum foliolo terminali conformibus sub aequilongis, vel foliolis jugae inferioris quam foliolo terminali minoribus, interjugis  $1\frac{1}{2}$ -2 cm. longis foliolo terminali  $\frac{1}{4}$ -plo brevioribus, petiolis communibus (ab axillis usque ad jugam infimam) 3-4 cm. longis dimidium folioli terminalis in longitudine aequantibus cum interjugis supra tenuissime sulcatis ad insertionem foliolorum hirsutis basi dilatatis cum stipulo 4 mm. latis, stipulis linearibus cum petiolo latere interiore usque ad  $1\frac{1}{2}$  cm. connatis  $1\frac{1}{2}$  mm. latis, partibus liberis caudato-linearibus 3-4 mm. longis plus minus patentibus margine hirsutis. Cymae ad ramulos terminales 5 cm. longae 10 cm. latae, rhachibus quam pedicello brevioribus leviter pubescentibus, pedicellis longissimis gracillimis 3-4 cm. longis simpliciter pubescentibus glandulis minutis stipitatis laxiuscule instructis, glandulis cum stipitibus  $\frac{1}{6}$  mm. longis apice globuliferis transverse patentissimis, vel simpliciter glanduloso-pilosis basi bracteis singulis instructis, bracteis oblongis acuminatis 5 mm. longis margine ciliolatis vel haud ciliolatis caducissimis nervoso-reticulatis; pedicellis apice gradatim ad calycis tutum abeuntibus. Calycis tubus oblongo-cylindricus 5-6 mm. longus  $2\frac{1}{2}$  mm. latus deorsum hirsutus sursum glaber apice plus minus distincte constrictus  $1\frac{1}{2}$  mm. latus; calycis lobis in flore apertienti valde reflexis ab apice calycis tubi verticaliter pendulis lineari-ovato-lanceolatis 15 mm. longis  $3\frac{1}{2}$  mm. latis apice longe acuminato-caudatis basi plus minus angustioribus  $1\frac{1}{2}$  mm. latis margine integris vel utroque latere infra medium appendicibus linearibus 2-3 mm. longis  $\frac{1}{4}$  mm. latis instructis extus deorsum glabris medio sursum tenuiter hirsutis parce glanduloso-setigeris margine dense villosis intus densissime villosis. Petala 5 alba obovata circ. 2 cm. longa  $1\frac{1}{2}$  cm. lata apice subrotundata truncato-rotundata basi triangulari-cuneata ad insertionem obtusa 1 mm. lata ad basin crassiuscula margine subintegra vel sursum eroso-integra. Stamina  $\infty$  ad discum annulare apicis tubi calycis elevatum inserta,

filamentis glabris, antheris didymis 0-0-formibus (connectivis  $\frac{3}{4}$  mm. longis) utrinque profunde emarginatis glabris: disco basi styli et apice tubi calycis insito conico 1 mm. longo glabro; stylo 6 mm. longo columniformi dense patento-hirsuto multistriato apice multilobo, lobis mediis longissimis lateralibus exterioribus gradatim brevioribus toto longitudine connatis; stigmata ad apicem lobarum terminalia peltata, peltis latere uno fissis, margine denticulato-lobulata; ovula  $\infty$  fusiformia pilosissima, pilis validis rectis.

*Cotoneaster* MEDIK.



**Cotoneaster morrisonensis** HAYATA sp. nov. Frutex humilis minus quam 1 m. altus ramosissimus, ramis et ramulis cinerascens glabris plus minus rugosis laxe lenticellatis, lenticellis minutis elevatis transverse oblongis rubescentibus, ramulis foliatis brevibus a ramo divaricatis basi vel sursum pulvinis foliorum approximatis vel remotis alternis instructis, pulvinis valde elevatis, ramulis sursum foliatis. Folia valde coriacea supra nitida versus apicem ramulorum approximativim alternativim sita oblonga vel oblongo-obovata 6-9 mm. longa 4-6 mm. lata apice obtusa vel rotundato-obtusa vel tenuissime emarginata basi obtuso-acuta vel cuneato-acuta margine integerrima primum fusco-strigoso-tomentosa demum glabra supra nitida in exsiccato pallido-fulvescentia subtus pallido-flavescentia vel fulvescentia vel subtus interdum reliquis tomentorum oblecta margine deorsum recurva, costa supra profunde impressa subtus prominente elevata recta ad apicem foliorum attingenti validiuscula apice interdum mucronatim producta, mucronibus obtusis, venis venulis reticulis venularum supra latiuscule tenuiter impressis, venis subtus tenuiter elevatis, reticulis venularum subtus tenuiter impressis, areolis reticulorum subtus plus minus tenuiter elevatis, reticulis subtus fusco-coloratis distincte visis, venis lateralibus primariis utroque latere costae 3, mediis a costa angulo 30° egressis plus minus arcuatis sursum cum eis superioribus junctis, petiolis 2-3 mm. longis intus sulcatis strigoso-hirsutis vel subglabris, stipulis caducissimis  $1\frac{1}{3}$  mm. longis  $\frac{3}{4}$  mm. latis apice acuminatis extus hirsutis intus glabris. Flores ignoti. Fructus quasi-terminales ad apicem ramuli foliati solitariter siti, (pedicellis brevissimis 1-2 mm. longis strigoso-hirsutis, pilis adpressis nigricantibus), obovoideo-oblongi 4-5 mm. longi  $3\frac{1}{2}$  mm. lati rubescentes apice calycis lobis persistentibus suberectis triangularibus circ. 2 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusis margine

haud integris coronati facie glabri, carpellis semper 2 obovato-oblongis 4 mm. longis  $2\frac{3}{4}$  mm. latis apice rotundatis sed ad centrum reliquo styli apiculatis basi acutis ventrali planis cum altris firme contactis sed haud connatis dorso convexis complanatis minus quam 1 mm. crassis laevibus rubescentibus, dorso ad supra dimidium longitudinis cum calycis tubo connatis, dorso partibus liberis plus quam  $1\frac{1}{2}$  mm. longis sursum crispato-albo-barbatis, ventrali planis vel plus minus concavis dorso convexis  $\wedge$ -formibus in sectione, exocarpiis (parietibus carpellorum) crassissimis crustaceis; semina ignota.

HAB. Mt. Morrison, ad 10000 ped. alt., leg. U. MORI, Oct. 1906.

Very near *Cotoneaster rokujodaisanensis* HAYATA, but distinguishable from it in having two carpels and a little smaller and much paler leaves. The reticulation of the veinlets on the upper surface of the leaves is, in this species, impressed and distinctly visible, while in *C. rokujodaisanensis* the veins are not at all impressed or are hardly visible, except those locating near the margin.

***Cotoneaster rokujodaisanensis* HAYATA sp. nov.** Frutex humilis circ. minus quam 1 m. altus ramosissimus, ramis subrectis haud flexuosis, cortice cinerascenti glabro plus minus rugoso haud lenticellato, ramulis brevibus 2-3 cm. longis rectis alternatim e ramo oriundis a ramo angulo recto vel 80° egressis deorsum sub lente scabris sursum fulvo-tomentosis rubescentibus, pulvinis foliorum alternatim dense vel approximativ notatis, pulvinis elevatis dorso plus minus elevatis apice cicatricibus foliorum semi-rotundatis truncatim terminatis; ramulis foliiferis e basi vel e latere partum defoliatarum ramorum oriundis brevissimis minus quam 1 cm. longis. Folia caducissima versus apicem ramulorum alternatim approximativ disposita primum dense strigoso-tomentosa, tomentis fuscentibus, demum glabrata valde coriacea supra nitida in exsiccatto fuscentia subtus fulvo-rubescens obovata vel oblonga 8-12 mm. longa 9-6 mm. lata apice obtusissima vel tenuiter emarginata vel interdum partibus costarum productis mucronata basi cuneato-obtusa vel acuta margine leviter deorsum recurva integra plus minus reliquis tomentorum instructa, costis venis venulis supra profunde impressis, costis subtus prominente elevatis rectis ad apicem foliorum attingentibus rectis interdum ad apicem foliorum mucroniforme productis, venis lateralibus subtus tenuiter elevatis, venulis subtus tenuissime impressis fusco-coloratis reticulatis, reticulis supra vix subtus distincte visis, areolis intra-

reticularibus subtus tenuiter elevatis, venis lateralibus primariis utroque latere costæ 5-6, mediis a costa angulo 30°-40° egressis leviter arcuatis prope apicem furcatim ramosis, areolis intra venas laterales primarias a margine  $\frac{1}{2}$ -1 mm. distantibus, petiolis  $2\frac{1}{2}$ -2 mm. longis strigoso-hirsutis intus profunde sulcatis, stipulis caducissimis linearibus 2 mm. longis  $\frac{2}{3}$  mm. latis 1-nerviis crassiusculis extus strigoso-hirsutis intus glabris apice acutis vel obtusis. Flores ignoti. Fructus rubescentes ad apicem ramuli foliati terminales solitarii vel ad axillas foliorum superiorum axillares, (pedunculis 3 mm. longis strigoso-hirsutis), oblongo-obovoidei apice calycis lobis persistentibus incurvis coronati 7 mm. longi 5 mm. lati apice obtusi basi rotundati, calycis lobis triangularibus  $1\frac{2}{3}$  mm. longis apice obtusissimis basi latissimis 2 mm. latis ad carpellum firme adpresse contactis vel interdum subrectis, carpellis 3 rubescentibus obovoideo—-formibus trigono-obovoideis (vel obovoideo-octanti-formibus) apice rotundatis basi acutis, in sectione -formibus 5 mm. longis 3 mm. latis  $1\frac{1}{2}$  mm. crassis apice barbatis, (barbis albis), dorso convexis ventrali bi-angulatis ad angulos acutis glabris lævibus, dorso ad  $\frac{4}{5}$  longitudinis cum tubo calycis adnatis sursum  $\frac{1}{5}$  liberis, partibus liberis 1 mm. longis, exocarpiis (parietibus carpellorum) crassis crustaceis; carpellis ventrali ad apicem anguli ventralis et ad basin partis libere reliquis stylosum brevissime apiculatis vel punctatis. Semina complanata obovata apice rotundata basi acuta, testa rubescenti membranacea; albuminibus subnullis; embryo obovatus, cotyledonibus amplis, radicula minuta apice acuta.

HAB. Byōritsu: Mt. Rokujōdaisan, ad 10000 ped. alt., leg. U. MORI, Oct. 1908.

Very near *Cotoneaster disticha* LANGE (SCHNEIDER Handb. Laubholz. I. p. 745, fig. 418 c-f u. 419, a-b, = *Cotoneaster rotundifolia* BAKER in Bot. Mag. t. 8010), but easily distinguishable from it by the much smaller fruits. Also near *C. Zabeli* (SCHNEIDER l.c. I. p. 749, fig. 420 f-h), but separable from it also by the much smaller fruits. Most closely allied to *Cotoneaster morrisonensis* HAYATA, but different from it in having three carpels and not lenticellate branches and in the leaves which are a little larger and much darker above in dried specimens. In *C. morrisonensis*, the carpels are usually two, and the branches are more or less lenticellate.



*Photinia* LINDL.

***Photinia ardisiifolia*** HAYATA sp. nov. Arbruscula? rami et ramuli

cinerascetes longitudinaliter rugosi parce lenticellati, lenticellis elevatis minutis elevatis  $1\frac{2}{3}$  mm. in diametro. Folia persistentia obovato-oblanccolata vel spatulato-oblanccolata  $7\frac{1}{2}$ –10 cm. longa 22–30 mm. lata apice obtusissima vel subrotundata ad centrum summorum mucronata, mucronibus  $\frac{1}{2}$  mm. longis obtusis haud aristatis basi gradatim cuneato-attenuata ad petiolum abeuntia margine integra vel subintegra versus apicem remote crenata vel subintegra, costa supra impresso-canaliculata subtus elevata, venis supra tenuissime impressis subtus tenuissime elevatis, venulis supra haud visis subtus tenuissime visis, utraque pagine glaberrima, in exsiccato supra nitida fusco-rubro-fulvescentia, subtus pallida fulvescentia, venis lateralibus primariis utroque latere costæ 15–18 tenuissimis gracillimis, mediis a costa angulo  $70^\circ$  egressis rectis vix vel haud arcuatis prope margine furcato-ramosis ramis cum eis superioribus junctis, venulis gracillimis vix visis, petiolis 1–2 cm. longis glabris intus profunde canaliculatis. Cymæ terminales 6 cm. longæ totiusque latæ profuse florifere, rhachibus gracilibus pubescentibus, bracteis minutis caducissimis 1 mm. longis obtusis hirsutis. Flores apertientes non visi. Alabastrum florum turbinatum apice triangulari-acutum vel triangulari-obtusum basi triangulari-acutum ad pedicellum 5 mm. longum abeuns. Calyx obtriangularis  $2\frac{1}{2}$  mm. longus intus glaber  $3\frac{1}{2}$  mm. latus apice 5-lobatus extus pubescens inter glaber, lobis triangularibus 1 mm. longis plus quam 1 mm. latis apice obtusis extus hirsutis intus glabris crassiusculis margine dense tomentosus; calycis lobis basi leviter imbricatis intus apice barbatis. Petala rotundata 2 mm. longa apice plus minus emarginata basi contracta leviter cordata ad basin  $\frac{1}{2}$  mm. lata intus plus minus leviter barbata vel subglabra. Stamina  $\infty$  paullo supra basin loborum calycis inserta ut videntur 1-seriatim disposita, filamentis complanatis, antheris oblongis apice subtruncatis basi emarginatis  $\frac{2}{3}$  mm. longis. Ovarium inferius glabrum, stylo glabro columniformi apice 2-fisso, stigmatibus peltatis. Fructus calycibus complete inclusus cum calycibus subrotundatus 7–8 mm. longus apice truncatus facie glaber in exsiccato fusco-nigricans apice limbo et lobis calycis perfecte clausus, lobis intus inflexis; partibus apicalibus fructus apice plus minus liberis sed non exsertis, partibus liberis convexis  $1\frac{1}{2}$  mm. altis glabris; exocarpiis (in sensu

vero parietibus carpellorum) crustaceis; fructus 2-spermi? Semina ovoideo-oblonga  $\pm$  angulata  $3\frac{1}{2}$  mm. longa 2 mm. lata utrinque obtusa, testa fusco-rubescenti glabra tenuiter longitudinaliter rugulosa coriacea; albumen paucissimum, cotyledonibus oblongis 3 mm. longis apice obtusis basi  $\pm$  cordatis vel rotundatis 2 mm. latis crassiusculis, radícula 1 mm. longa leviter recurva.

HAB. Taitō: Manchōsha, leg. G. NAKAHARA, Jan. 1906 (Fl. et Fr.).

This is very likely identical with *Photinia pustulata* LINDL. LINDLEY'S original description is not accessible to me. The only description of this species is that mentioned in WALP. Rep. II. p. 57: "Foliis obovato-lanceolatis acutis basi cuneatis, supra medium serratis, levibus, utrinque glabris; corymbis calvis multifloris; ramulis pustulatis.—In China ad Cantonem." So far as are concerned the characters given in the above description, our plant may be identical with *P. pustulata*; yet it may, at the same time, not be the same, regarding other characters not mentioned in the description. In such a case, it will be the best way to describe our plant as exhaustively as possible and to give it a provisional name, so that any one who is familiar with *P. pustulata*, in tracing my description, might find no difficulty to decide at once whether my species is distinct from or identical with the former. Our plant does not, however, agree with the description given in SCHNEIDER'S Handb. Laubholz. I. p. 710, which is as follows. "Zw. und Blst. dichtwarzig; B. derblederig, ca. 8:4 cm., eifg., beidendig zugespitzt, kahl; Stiel ca. 8 mm; Frst ca. 6 cm. Dm., Fr. elliptisch, 9:6–7 mm." Fruits of our plant are not elliptical but rounded, nearly 7 mm. in diameter.

**Photinia Beauverdiana** SCHNEIDER var. **notabilis** REHDER et WILSON in Pl. Wilson. Part II. p. 188. Arbruscula? Ramuli in exsiccato fusco-purpurascens glabri haud vel vix rugosi minute lenticellati, lenticellis minutis plus minus oblongis medio subfissis  $\frac{2}{3}$  mm. longis. Folia ut videntur decidua versus apicem ramulorum alternatim plus minus approximativ disposita chartacea vel chartaceo-coriacea in exsiccato fusco-rubescens supra glabra subnitida subtus pallidiora tenuiter pubescentia obovato-oblonga vel oblonga vel oblanceolata 8–15 cm. longa  $3\frac{1}{2}$ –4 cm. lata apice caudato-acuminata vel subito acuminata basi obtusa vel cuneato-attenuata vel truncato-rotundata æqualia vel plus minus obliqua margine subregulariter serrulata, (serrulis mediis latere

inferiore 3 mm. longis latere superiore  $\frac{1}{2}$  mm. longis valde ascendentibus interdum ad mucronem reductis apice sursum recurvis), versus basin integra vel subintegra, costis venis reticulis venularum supra tenuiter impressis, subtus costis venis lateralibus primariis et secundariis principalibus tenuiter elevatis, sed reticulis venularum subtus minutis distincte impressis, areolis reticulorum subtus elevatis subhexagonis  $\frac{1}{3}$  mm. in diametro, venis lateralibus primariis utroque latere costæ 10-12, mediis a costa angulo  $35^\circ$  egressis prope apicem subito ramosis evanescentibus, petiolis 8 mm. longis subglabris intus profunde sulcatis basi plus minus dilatatis vel haud dilatatis sursum subalatis. Gemma ovoidea apice acuta. Flores ignoti. Fructus cymoso-paniculati, paniculis terminalibus 3-20-fructiferis, rhachibus glabris fusco-purpurascensibus minute densiusculis lenticellatis, lenticellis oblongis. Fructus calycibus inclusus cum calycibus 8 mm. longus  $6\frac{1}{2}$  mm. latus obovoideus apice truncatus basi subito ad pedicellum circ. 1 cm. longum abeuns facie in exsiccatto fuscens sublævis apice calycis lobis persistentibus coronatus, calycis lobis recurvis ad fructus adpressis semirotundatis triangularibus 1 mm. longis  $1\frac{1}{2}$  mm. latis intus concavis glabris; fructus apice ad circ.  $2\frac{1}{2}$  mm. liber, supra calycis tubum circ. 1 mm. exsertus, partibus liberis glabris pallidioribus apice rotundatis parte basilari styli coronatis. Semina in fructu singulo 3-4 rubro-purpurascensia glabra oblongo-polygona latere valde complanata 5-6 mm. longa  $4\frac{1}{2}$  mm. lata, testa rubro-purpurascens longitudinaliter reticulato-ruminato-sulcata coriacea; albuminibus paucissimis; embryo amplius cavum seminum fere perfecte occupans 5 mm. longus 3 mm. latus valde complanatus plus minus obliquus, cotyledonibus valde complanatis oblique oblongis apice basi que rotundatis 4 mm. longis 3 mm. latis, radícula brevissima  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata.

HAB. Tonno-fushirowan, leg. S. NAKAI et I. TANAKA, Oct. 1913, (Fr.).

So far as is concerned the description given by SCHNEIDER, our plant may very probably be identical with this species. Our specimen is lacking flowers. It should be compared again with the original description, when flowering specimens are collected.

**Photinia impressivena** HAYATA sp. nov. Arbruscula; ramuli in exsiccatto fusco-purpurascens teretes lenticellati læves vel sursum longitudinaliter rugulosi, lenticellis minutis subrotundatis rubescentibus  $\frac{1}{2}$  mm. in diametro. Folia

versus apicem approximativè disposita coriacea obovato-oblanccolata vel oblanceolata  $5\frac{1}{2}$ - $7\frac{1}{2}$  cm. longa 17-22 mm. lata apice subito acuminata basi obtusa vel cuneato-attenuata ad extremitatem obtusa margine minute serrata, serrulis brevissimis inferioribus ad mucronem reductis, superioribus latere inferiore 2 mm. longis latere superiore  $\frac{1}{2}$  mm. longis valde ascendentibus ad acumen basinque integra, in exsiccatò supra viridescencia subtus pallidissima supra nitida utroque pagine glaberrima, costis venis primariis supra profunde impressis subtus prominente elevatis, reticulis ventularum supra tenuiter impressis subtus tenuiter elevatis, venis primariis lateralibus utroque latere costæ 6-7, mediis a costa circ. angulo  $45^\circ$  egressis deorsum rectis sursum subito arcuatis cum eis superioribus junctis, areolis inter venas primarias apice a margine  $1-1\frac{1}{2}$  mm. distantibus, petiolis brevissimis vel subnullis rubescentibus. Gemma ovoidea acuta fusco-rubescens. Flores ignoti. Fructus cymosi, cymis terminalibus 2 cm. longis 3 cm. latis pauci-3-5-fructiferis, pedicellis gracilibus 4 mm. longis dense lenticellatis glabris, lenticellis elevatis longitudinaliter oblongis  $\frac{1}{2}$  mm. longis, fuscentibus; fructus calycis tubis complete inclusus cum calycibus urceolato-ovoideis 10 mm. longis 8 mm. latis apice calycis limbo et lobis coronatus, tubo calycis rotundato  $7\frac{1}{2}$  mm. longo 8 mm. lato facie glabro rubescenti apice plus minus constricto, limbo plus minus expanso vel suberecto  $1\frac{1}{2}$  mm. alto, lobis limbi calycis perfecte triangularibus erectis apice acutis 2 mm. longis  $2\frac{1}{2}$  mm. latis rubescentibus basi intus reliquis filamentorum instructis; fructus abortu 1-spermi. Semina fusco-rubescencia ovato-rotundata plus quam 5 mm. longa minus quam 5 mm. lata, testa coriacea lævi glabra; albumen paucissimum; embryo amplius cavum seminum perfecte occupans cordato-rotundatus, cotyledonibus leviter cordatis apice triangulari-obtusis basi tenuiter cordatis plus quam 4 mm. longis 4 mm. latis crassissimis; radicula minuta brevissima  $\frac{2}{3}$  mm. longa obtriangulari apice acuta.

HAB. Fokien: Mt. Kozan, leg. S. NAGASAWA, Nov. 1909, (Fr.).

Somewhat near *Photinia amphidoxa* REHDER et WILLSON (= *Stranvaesia amphidoxa* SCHNEIDER Handb. Laubholzk. I. p. 713, fig. 394, k-l.), but widely different from it in having quite glabrous sessile leaves and in many other points.

**Photinia lucida** SCHNEIDER Handb. Laubholzk. I. p. 710.

HAB. Formosa: "OLDHAM, No. 99."

Very near to or identical with  
*Photinia taiwanensis* HAYATA Mater.  
Fl. Formos. p. 104.

***Photinia serrulata* LINDL.**  
(Fig. 12) HAYATA Mater. Fl. Formos.  
p. 104; SCHNEIDER Handb. Laubho-  
lzk. I. p. 707, fig. 390, a—b, et fig.  
391, a—b.

HAB. Mt. Arisan: Tōzan. leg.  
B. HAYATA, Aprili. 1914.

Fl. white, anthers green.

***Photinia* sp.**

HAB. Mt. Arisan inter Karapin  
et Suisharyō, leg. I. TANAKA et B.  
HAYATA, Aprili. 1914.

Somewhat near *P. taiwanensis*  
HAYATA or *P. lucida* SCHN., but  
separable from it by the quite gla-  
brous and much smaller leaves. Too  
imperfect for a description.

***Prinsepia* ROYLE.**

***Prinsepia scandens* HAYATA**  
sp. nov. (Fig. 12-A); *Prinsepia utilis*  
HAYATA Mater. Fl. Formos. p. 105,  
(non ROYLE).

The present plant was identi-  
fied by myself with the Himalayan

*P. utilis* only by the external comparison of the branches. In examining  
the tree in the mountains in Formosa, I became very much sceptical of the  
identification. It is a shrub of scandent habit like *Celastrus articulatus*,  
trailing and climbing up to the top of other tall trees, and sending its  
branches downwards. This habit is, it seems to me, totally different from  
that of the Himalayan plant and also from the Chinese *P. sinensis* OLIVER.

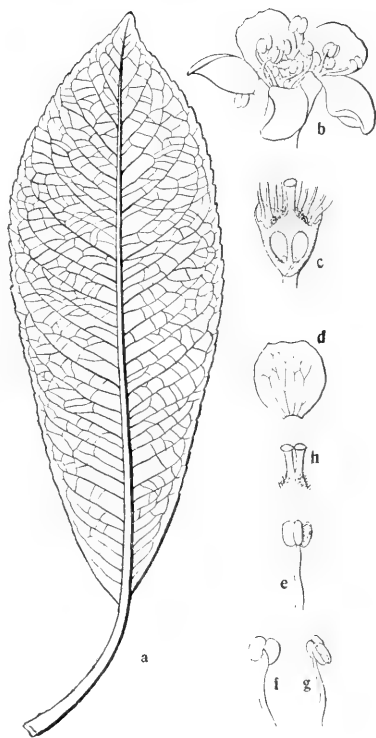


FIG. 12, *Photinia serrulata* LINDL.; a, a leaf;  
b, a flower,  $\times 9$ ; c, vertical section of the ovary,  
 $\times 9$ ; d, a petal  $\times 9$ ; e, f, g, stamens, seen from  
different sides; h, a style, magnified.

The leaves of our plant are much smaller than those of the Himalayan. Since the Chinese plant is proved to be different from the Himalayan, it is very likely that our plant should also be different from the latter, as is conjectured from its different habit of the tree and the different size of the leaves.

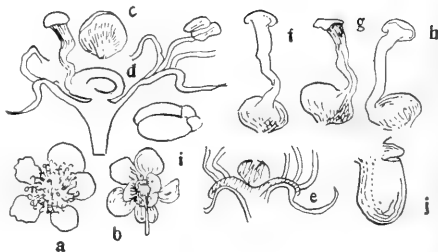


Fig. 12—A, *Prinsepia scandens* HAYATA; a, a flower; b, the same, seen from back; c, a petal; d, vertical section of a flower; e, another vertical section of the same, ovary and disc shaded; f, g, h, pistil, seen from different sides; i, collateral ovules; j, one of the same ovules, much more magnified.

## Saxifrageæ.

### *Hydrangea* LINN.

***Hydrangea integra*** HAYATA Fl. Mont. Formos. p. 90, t. 7; Ic. Pl. Formos. III. p. 107, fig. 17.

HAB. Mt. Arisan inter Nimandaira et Heishana, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

The specimens which we collected in the mountains are wanting marginal flowers. Yet in every respect they are identical with *H. integra*. It may be ascribable to the season of flowering, whether the plant has marginal flowers or not. Calyx tubes are fresh-green, the lobes greenish white, while petals and stamens are purely white.

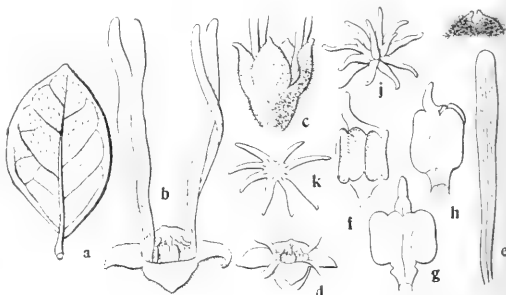


Fig. 13, *Loropetalum chinense* DC.; a, a leaf; b, a flower; c, the same, seen from side; d, the same, seen from front; e, a petal; f, g, h, stamens, seen from different sides; i, ovary; j, k, a stellate hair, seen from different sides; l, natural size, others variously magnified.

## Hamamelideæ.

*Loropetalum* R. Br.

***Loropetalum chinense*** R. Br. (Fig. 13); S. MOORE in Jour. Bot. (1878) p. 138; HANCE in Jour. Bot. (1878) p. 226; HEMSLEY in Ind. Fl. Sin. I. p. 290; SCHNEIDER Handb. Laubholz. I. p. 433, fig. 275, k-l, et fig. 277, h-n.

HAB. Fokien, Yesan, leg. S. NAGASAWA, Aprili. 1910 (Fl.).

DISTRIB. Khasia mountains, India, China.

## Onagrariæ.

*Circæa* LINN.

***Circæa Kawakamii*** HAYATA sp. nov. (Fig. 14). Herba basi lignosa basi prostrata ad nodos radicans supra basin ascendente-erecta annua; caulis 30 cm. longus glaberrimus teres vel subtetragonus rubescens. Folia opposita ovata vel ovato-oblonga 5 cm. longa 22 mm. lata apice acuminata vel cuspidato-acuminata basi rotundata truncata vel triangulari-obtusa vel late triangulari-acuta margine remotissime tenuissime eroso-undulata, undulis apice mucronibus minutis instructis, mucronibus a se 5 mm. remotis, supra subglabra vel tenuissime ad costas pubescentia subtus subglabra, costis venisque supra haud elevatis haud impressis subtus tenuiter elevatis, venis lateralibus primariis utroque latere costæ 5-7, mediis a costa angulo 45° egressis basi subrectis sursum prope marginem subito arcuatis cum iis superioribus areolam formantibus, venulis haud distinctis haud visis, petiolis in longitudine valde variabilibus 2-15 mm. longis subglabris basi plus minus dilatatis. Racemi terminales vel axillares cum pedunculis 3-6 cm. longis, pedunculis 2-3 cm. longis glabris apice bracteolis lanceolatis 6-7 mm. longis oppositis instructis; rhachis racemi 3-4 cm. longa pedunculis longior glabra flores alternatim gerens, pedicellis 3 mm. longis horizontaliter patentibus basi

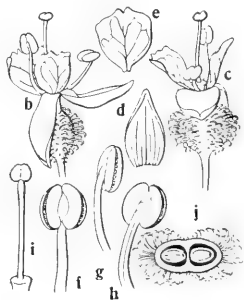


Fig. 14, *Circæa Kawakamii* HAYATA; a, a leaf, natural size; b, a flower, seen from side,  $\times 5$ ; c, the same, seen from another side,  $\times 5$ ; d, a sepal,  $\times 5$ ; e, a petal,  $\times 5$ ; f, g, h, stamens seen from different sides,  $\times 7$ ; i, a style and discus,  $\times 7$ ; j, cross section of a fruit  $\times 7$ .

longi, pedunculis 2-3 cm. longis glabris apice bracteolis lanceolatis 6-7 mm. longis oppositis instructis; rhachis racemi 3-4 cm. longa pedunculis longior glabra flores alternatim gerens, pedicellis 3 mm. longis horizontaliter patentibus basi

bractea una et bracteolis duabus instructis glabris, bracteis linearibus 1-2 mm. longis, interdum præsertim sursum versus apicem racemorum ad nullum reductis, bracteolis duabus latere basis pedicellorum semper sitis subulatis minutis  $\frac{1}{2}$ - $\frac{3}{4}$  mm. longis, pedicellis generaliter 2-3 mm. longis glabris. Calycis tubus cum ovario connatus late obovoideus apice longe rostratus, parte obovoidea (vel ovario) 1 mm. longa totiusque lata extus dense pilosa, pilis rectis patentissimis apice uncinato-recurvis fere vel minus quam  $\frac{1}{2}$  mm. longis, rostro  $\frac{1}{2}$  mm. longo glabro  $\frac{1}{3}$  mm. in diametro, limbo calycis perfecte 2-partito, partibus vel sepalis 2 lanceolatis  $2\frac{1}{2}$  mm. longis 1 mm. latis apice obtusis basi haud contractis intus concavis extus convexis a basi subito deorsum reflexis. Petala 2 ad apicem calycis tubi inserta obtriangularia  $1\frac{2}{3}$  mm. longa totiusque lata apice in ambitu rotundato-truncata ad centrum tenuiter retusa basi triangulari-acuta ad insertionem  $\frac{1}{10}$  mm. lata, margine partibus apicalibus exceptis integra, parte apicali suberosa vel subintegra, alba, venis grosse reticulatis distincte visis. Stamina 2 cum petalis alterna, filamentis  $1\frac{1}{2}$ -2 mm. longis teretibus glabris, antheris rotundatis plus quam  $\frac{1}{2}$  mm. longis latisque utroque emarginatis. Discus ad apicem tubi calycis insertus tubiformis  $\frac{1}{2}$  mm. altus crassissimus basin styli involvens, stylo filiformi 2 mm. longo glabro ab apice tubi calycis usque ad apicem 2 mm. longo apice plus minus dilatato stigmatoso. Ovarium 2-loculare, loculis 1-ovulatis, ovulis erectis anatropis; raphe ventrali. Fructus maturus ignotus.

HAB. Ritōzan, leg. T. KAWAKAMI, Aug. 1913.

Near *Circea erubescens* FR. et SAV., but, distinguishable from it by the petals which are emarginate or 2-lobed at the apex; also allied to *C. quadrifida* MAXIM., but differs from it by the rounded, but not clavate, stigmata and in having much smaller leaves.

**Circea Pricei** HAYATA sp. nov. Herba tenuis; caulis tetragonus ascendens erectus glaber haud ramosus. Folia longe petiolata ovato-rhomboidæa 3 cm. longa 18 mm. lata apice triangulari-acuta sed ad summum obtusa basi late cuneata vel rotundato-cuneata margine remotissime dentata, dentibus brevissimis u-formibus plus minus ascendentibus, membranacea utraque pagine parce pubescentia prope basin integra, costis venisque utraque pagine haud elevatis vel haud impressis, venis lateralibus primariis utroque latere 3-4 a costa angulo



40° egressis, petiolis 13 mm. longis pubescentibus basi plus minus dilatatis. Racemi terminales vel axillares cum pedunculis 2-5 cm. longi haud ramosi, pedunculis 1-3 cm. longis hirsutis, pedicellis 1-3 mm. longis post anthesin prolongatis, fructiferis 1 cm. longis, bracteis minutis, pedicellis basi cum rhachibus articulatis subglabris vel tenuissime hirsutis apice ad calycis tubum abeuntibus. Calycis tubus obovoideus  $\frac{2}{3}$  mm. longus  $\frac{1}{3}$  mm. latus glaber apice constrictus basi gradatim ad pedicellum attenuatus, limbo basi campanulato, partibus basilaribus indivisis  $\frac{1}{4}$  mm. longis campanulatis sursum 2-lobis, lobis oblongis deorsum reflexis extus valde concavis intus convexis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis apice acutis glabris. Petala 2 obtriangularia  $1\frac{1}{4}$  mm. longa totiusque lata apice obcordata 2-lobata, lobis apice rotundatis  $\frac{1}{3}$ - $\frac{1}{2}$  mm. longis latisque, glabra basi valde cuspidato-cuneata ad insertionem  $\frac{1}{5}$  mm. lata 3-nervia, nervis a basi paullo sursum connatis ibique divaricatis. Stamina 2, filamentis glabris filiformibus erectis rectis 1 mm. longis, antheris globoso-reniformibus  $\frac{1}{5}$  mm. longis latisque; stylo columniformi 1 mm. longo glabro apice stigmatifero, stigmate globoso inaequaliter 2-lobato. Fructus obovoideo-ellipticus 2 mm. longus  $1\frac{1}{4}$  mm. latus apice obtusissimus basi attenuatus valde complanatus pilis unciformibus dense obtectus 1-spermus. Semina obovato-lanceolata vel oblanceolata valde complanata 2 mm. longa  $\frac{2}{3}$  mm. lata apice obtusissima basi acuta, testa levi coriacea membranacea fulvescenti; albumen paucum; embryo elongato-oblongus, radícula infra cotyledones  $\frac{1}{3}$ -plo in longitudine æquanti, cotyledonibus amplis 1 mm. longis  $\frac{2}{3}$  mm. latis oblongis complanatis albis. Ovarium 1-loculare 1-ovulatum, ovulis e pariete ovarii a basi ad  $\frac{2}{3}$  altitudinem oriundis subpendulis amphitropis; micropyle ad extremitatem inferiorem sita.

HAB. Horisha: Taltaka, ad 6000 ped. alt., leg. W. R. PRICE.

Near *Circea alpina* LINN., but differs from it by the ovate, but not cordate, leaves; from *C. Kawakamii* HAYATA, in having nearly globose ovary, when it is yet young. Remarkable for its having uni-locular ovary with a solitary ovule.

## Passifloreæ.

### *Modecca* LAM.

***Modecca formosana*** HAYATA Ic. Pl. Formos. IV. p. 8.

HAB. Hōzan: Keiyenshō et in montibus Rukosan, leg. Y. TASHIRO, Feb. 1914.

## Araliaceæ.

### *Pentapanax* SEEM.

***Pentapanax castanopsisicola* HAYATA** (Tab. VII. et Fig. 15) sp. nov.  
Frutex 1–2 m. altus ad truncos arborum crescens. Rami subteretes ramosi apice 5–6 mm. in diametro sectionis, cortice demum plus minus soluto glabro fulvo-cinerascenti lenticellato longitudinaliter ruguloso, rugulis elevatis akeformibus, alis 1 mm. latis, lenticellis longitudinaliter oblongis 1 mm. longis elevatis et summo cupuliformiter impressis, cicatricibus foliorum  $\nabla$ -formibus triangulari-lunulatis, pulvinis plus minus elevatis longitudinaliter rugulosis. Folia decidua versus apicem ramorum approximativim alternatim disposita pinnata 5–7-foliolata, foliolo terminali minimo ovato-oblongo 10 cm. longo  $4\frac{1}{2}$  cm. lato apice acuminato basi obtusissimo vel rotundato margine partibus basilaribus integris exceptis minute tenuissimeque serrulato, serrulis minutis apice aristis 1 mm. longis instructis, aristis 2 mm. remotis, chartaceo, utraque pagine glabro vel subglabro, costis venis venulisque supra distincte elevatis reticulatis, subtus venulis minus elevatis minus distinctis, venis primariis lateralibus utroque latere 10–15, mediis a costa angulo  $60^\circ$  egressis deorsum prope costam rectis sursum arcuatis prope marginem ad ramos minutos abeuntibus, petiolulo terminali  $2\frac{1}{2}$  cm. longo lamina 4-plo brevior; foliolis lateralibus oppositis quam foliolo terminali majoribus basi plus minus obliquis vel aequalibus sessilibus vel brevissime petiolulatis, jugis foliorum a se 6–7 cm. remotis, petiolo communi (a basi usque ad jugam infimam) 12 cm. longo, rhachidem in longitudine aequanti subtereti haud sulcato ad basin dilatato caulem semiamplectanti glabro; rhachis glabra haud sulcata subteres ad insertionem jugarum articulativim in fragmenta soluta plus minus lenticellata. Flores umbellati paniculati; paniculae semper terminales circ. 25 cm. longae 15 cm. tala apice rotundatae vel obtusissimae a basi ramosae floriferae deorsum ad basin

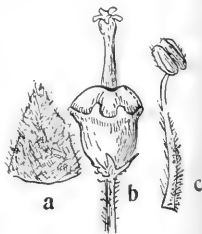


Fig. 15, *Pentapanax castanopsisicola* HAYATA; a, a petal; b, a flower, petals taken off; c, a stamen.

perulis magnis multis involutæ, perulis castaneis rotundato-triangularibus, interioribus majoribus  $1\frac{1}{2}$  cm. longis 2 cm. latis apice triangulari-acutis apiculatis vel rotundato-apiculatis extus rufo-ferrugineo-tomentosis intus glabris, exterioribus minoribus; rhachis panicularum recta erecta rubro-ferrugineo-tomentosa, ramis panicularum simplicibus alternatis a se 1-2 cm. remotis rectis, inferioribus longioribus 6 cm. longis horizontaliter patentissimis, superioribus gradatim brevioribus versus summum panicularum 3 cm. longis rectis ascendentibus sparse brevissime-ferrugineo hirsutis apice umbellam unam gerentibus, umbellis in circumscriptione globosis  $2\frac{1}{2}$  cm. in diametro circ. 50-radiatis, radiis (vel pedicellis florum) toto directione patentissimis rectis 1 cm. longis gracilibus ferrugineo-pilosis; bracteis ad basin ramorum panicularum sitis singulis linearilanceolatis  $1\frac{1}{2}$  cm. longis  $\frac{1}{2}$  cm. latis apice apiculato-acutis basi haud vel vix contractis integris interiore saccato-concavis glabris extus convexis prope basin hirsutis; bracteolis prope medium ramorum panicularum duabus sitis linearibus 4-5 mm. longis acuminatis basi saccatis extus prope basin hirsutis cæterum glabris; pedicellis vel radiis umbellarum basi bracteolis singulis linearibus 2 mm. longis instructis; receptaculum umbellarum globosum minutum 2 mm. in diametro; pedicellis apice sub calyce distincte articulatis leviter dilatatis ad bracteolas minutas 5-7 radiatim sitas expansis, bracteolis linearibus  $\frac{1}{3}$  mm. longis. Calyx glaber, tubo semi-globoso-obconico  $\frac{2}{3}$  mm. longo  $1\frac{1}{2}$  mm. lato, lobis 5 minutis triangularibus  $\frac{1}{3}$  mm. longis totiusque latis apice obtusis glabris, sinibus inter lobos rotundatis. Petala 5 caducissima oblongo-triangularia  $1\frac{1}{2}$  mm. longa 1 mm. lata apice obtusa basi latissima integra extus primum hirsutissima demum glabra intus semper glabra. Stamina 5, filamentis dorso complanatis 2 mm. longis  $\frac{1}{4}$  mm. latis apice angustissimis hirsutis, antheris oblongis albo-flavis primum hirsutis demum glabris 1 mm. longis  $\frac{1}{2}$  mm. lalis apice leviter basi profunde 2-lobatis. Discus conicus  $\frac{2}{3}$  mm. altus basi 2 mm. latus basin styli obtegens. Styli 5 a basi sursum usque ad prope apicem connati columniformes  $1\frac{1}{2}$  mm. longi glabri prope apicem et sub apice plus minus dilatati, partibus dilatatis globiformibus, supra partem dilatatam liberi radiatim patentes, partibus patentibus  $\frac{1}{3}$  mm. longis apice stigmatiferis, stigmatibus globosis. Ovarium cum calyce tubo connatum semi-globosum 5-loculare, ovulis in loculo solitariis pendulis anatropis, raphe ventrali. Bacca depresso-globosa 3 mm. longa plus quam

3 mm. lata 5-pyrena, pyrenis tenuiter crustaceis latere compressis pallido-flavis 1-spermis. Semina semi-ovata  $1\frac{2}{3}$  mm. longa 1 mm. lata latere compressa glabra lævia apice acuta basi rotundata latere interiore recta stria una alba notata dorso rotundata; albumen copiosum æquale; embryo minutus fere ignotus.

HAB. Mt. Arisan, Funkiko ad 6000 ped. alt., ad truncos *Castanopsis* crescens, leg. B. HAYATA et S. SASAKI, Jan. 1912.

The genus is new to the East Asiatic flora. Very distinct from all the other species of the genus.

## Caprifoliaceæ.

### *Viburnum* LINN.

***Viburnum taitense* HAYATA** (Fig. 16), Mater. Fl. Formos. p. 136; Ic. Pl. Formos. II. p. 72.

HAB. Mt. Arisan: Tōzan, leg. B. HAYATA, Aprili. 1915.

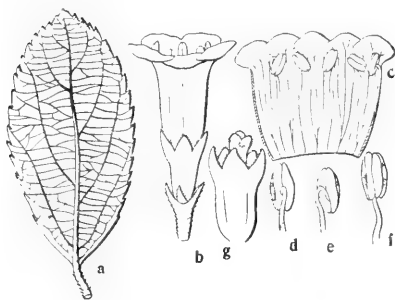


Fig. 16, *Viburnum taitense* HAYATA; a, a leaf, a much smaller form, natural size; b, a flower  $\times 2.5$ ; c, corolla, expanded,  $\times 2.5$ ; d, e, f, stamens; g, a flower, corolla taken off.

***Viburnum taiwanensis* HAYATA** (Fig. 17), Mater. Fl. Formos. p. 137; Ic. Pl. Formos. II. p. 73.

HAB. Mt. Arisan: inter Heishana et

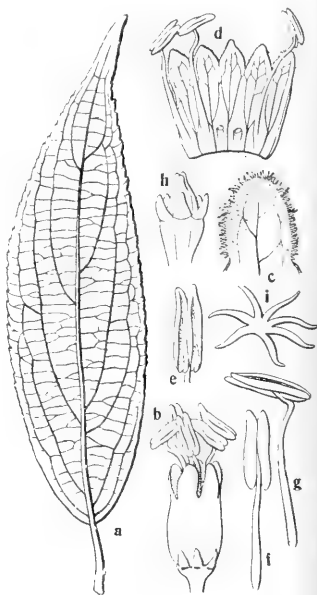


Fig. 17, *Viburnum taiwanense* HAYATA; a, a leaf, a much smaller form, natural size; b, a flower  $\times 4$ ; c, a calyx-lobe; d, corolla, expanded  $\times 5$ ; e, f, g, stamens; h, ovary; i, a stellate hair on the under surface of a leaf.

Nimandaira, leg. R. KANEHURA et I. TANAKA, Aprili. 1914.

Calyx and corolla reddish; stamens white.

Rubiaceæ.

*Diplospora* DC.

*Diplospora Tanakai* HAYATA sp. nov. (Fig. 18, a-f). Frutex; rami tere-

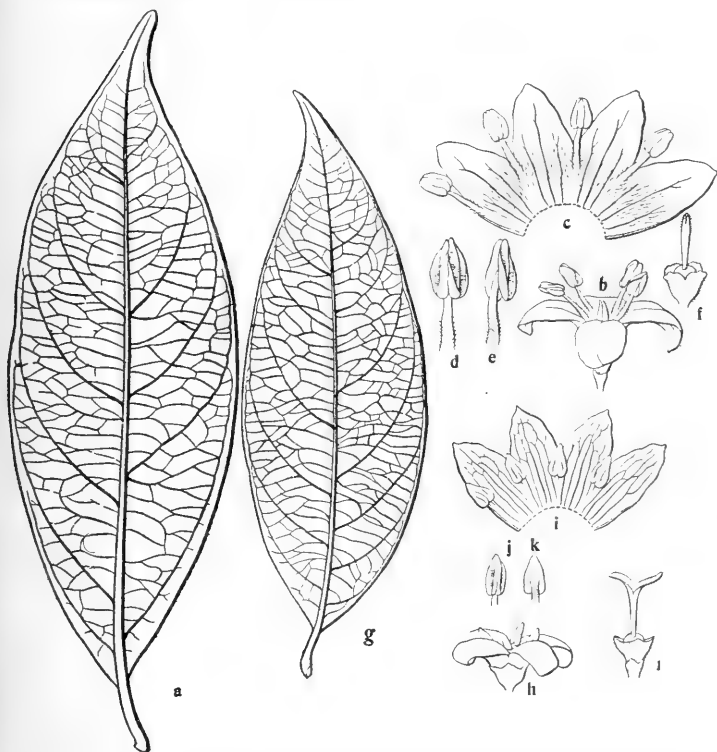


Fig. 18, a-f, *Diplospora Tanakai* HAYATA; a, a leaf; b, a flower; c, corolla, expanded; d, e, stamens, seen from different sides; f, ovary; g-l, *Diplospora viridiflora* DC; g, a leaf; h, a flower; i, corolla; j, k, stamens, seen from different sides; l, ovary; a, g, natural size; b, c, f, j, k,  $\times 3$ ; e, d  $\times 5$ ; h, i, l,  $\times 3.5$ .

tes, ramuli subtetragoni, cortice cinerascenti sed hac atque illae fusco-purpurascenti longitudinaliter fissis, ramulis hornotinis glabris in exsiccatō fusco-purpurascētib; rami annotini ad nodos reliquis stipularum instructi. Folia lanceolata vel oblanceolata 9–13 cm. longa 28–40 mm. lata apice acuminata basi obtusa vel acuminata ad petiolum attenuata margine integra utraq; pagine glabra supra in exsiccatō fusca subtus fulvo-pallidissima chartacea vel chartaceo-coriacea, costa supra deorsum sulcata sursum tenuiter elevata, venis venulisq; supra plus distincte elevatis subtus minus elevatis, venis lateralibus primariis utroq; latere costae 5–7, mediis a costa angulo 45° egressis sursum prope marginem gradatim secus marginem approximativ arcuatis, venulis secundariis subtus fere haud visis, petiolis 7–10 mm. longis dorso complanatis glabris supra fere late canaliculatis basi sensim vix dilatatis, stipulis interpetioralibus cuspidato-ovatis validiusculis 5 mm. longis 3 mm. latis extus glabris intus dense villosis cuspidibus 2 mm. longis. Flores viridi-flavi cymosi. Cymae sessiles axillares parvae 1½ cm. longae totiusq; latae ad axillas foliorum annotinorum sitae solitariae glabrae 10–15-floratae dense brevique villosae; rhachis subtetragona vel complanato-tetragona, bracteis oppositis se connatis cupulam formantibus plus minus acutis villosis ½ mm. longis, pedicellis ultimis 2 mm. longis. Calyx obconicus 2–3 mm. longus apice 3 mm. latus basi ad pedicellum abeuns apice tenuiter 4-lobatus, lobis latissimis ½ mm. longis apice rotundatis 1½ mm. latis minutissime hirsutis margine subciliolatis crassiusculis. Corolla pallido-viridiflava campanulata, tubo 3 mm. longo totiusq; lato campanulato extus glabro intus supra basin usque ad orem hirsuto basi glabro, limbo 4-partito, lobis ovato-oblongis 4½ mm. longis 3½ mm. latis apice obtusis oblique emarginatis basi haud vel vix contractis utraq; pagine glaberrimis sed apice plus minus ciliolatis vel haud ciliolatis intus convexis extus concavis a basi sursum deorsum reflexis. Stamina 4 ad orem tubi inter lobos affixa, filamentis 2 mm. longis intus parce hirsutis extus glabris basi latissimis sursum angustioribus complanatis, antheris ovato-oblongis 2½ mm. longis 1½ mm. latis apice basique emarginatis dorsifixis. Discus supra ovarium situs pulviniformis glaber ½ mm. altus 1½ mm. in diametro. Stylus columniformis 3½ mm. longus basi glaber sursum hirsutus apice usque ad fere medium 2-fissus, segmentis intus sulcatis stigmatis apice acutis. Ovarium 2-loculare, loculo 3-ovulato, ovulis medio axis

placentæ axialis affixis amphitropis, micropyle inferiore. Fructus ignoti.

HAB. Mt. Arisan, inter Heishana et Jujiro, leg. R. KANEHIRA et T. TANAKA, Aprili. 1914.

Allied to *Diplospora viridiflora* DC., but distinguishable from it by the much larger flowers with pubescent corolla-tubes and much longer exerted filaments. Also near *Diplospora pubescens* Hook. f. (Fl. Brit. Ind. III. p. 124), in the obscurely 4-lobed calyx and corolla tube with villose throat, but greatly different from it by the smaller quite glabrous leaves with a cuneate base.

***Diplospora viridiflora*** DC. (Fig. 18, g-l); HAYATA Ic. Pl. Formos. II. p. 95.

HAB. Mt. Arisan, inter Karapin et Suisharyō, leg. B. HAYATA et I. TANAKA, Aprili. 1914.

Flower-buds green; petals yellow.

*Serissa* COMM.

***Serissa Kawakamii*** HAYATA sp. nov. Frutex humilis ramosissimus, rami cortice fulvo-cinerascenti irregulariter fissi et soluto minute hirsuto haud lenticellato, ramulo basi cicatricibus et pulvinis foliorum dense notato, pulvinis  $\frac{1}{2}$  mm. longis dilatatis. Folia caducissima opposita approximativè deccusatinque disposita, maxima oblonga 7 mm. longa 5 mm. lata apice obtusa vel rotundata vel obtusa margine integerrima crassiuscula coriacea supra nitida subtus pallidiora supra glabra sed basi prope petiolum parce hirsuta margine crassiuscula deorsum tenuiter recurva sub microscopio sursum prope apicem minute setulosa subtus glaberrima, costa utraque pagine plus minus elevata, venis supra elevatis sed subtus haud elevatis subplanis obscuris, venulis vix vel haud visis, petiolis  $\frac{1}{2}$ – $\frac{2}{3}$  mm. longis dorso complanatis subtus glabris supra hirsutis cum pulvinis articulatis, stipulis inter pulvinos sitis latere cum pulvino connatis latissime triangularibus 1 mm. latis  $\frac{1}{10}$  mm. longis hirsutis apice 3-cuspidatis, cuspidate centrali longissimo validissimo circ. 2 mm. longo tereti, cuspidibus lateralibus minutis  $\frac{1}{2}$  mm. longis. Flores solitarii terminales sessiles. Corolla tubuloso-campanulata cum lobis 9 mm. longa extus glabra intus tubo hirsuta apice deorsum circ. ad  $\frac{1}{3}$  longitudinem lobata, lobis 5 oblongis 3 mm. longis apice obtusis. Stamina 5, sub sinibus inter lobos affixa, partibus liberis filamentorum 2 mm. longis filiformibus glabris, antheris linearibus 2 mm. longis  $\frac{1}{4}$  mm. latis; stylo  $4\frac{1}{2}$  mm. longo incluso glabro filiformi apice 2-fido, lobis linearibus 1 mm.

longis stigmatosis. Fructus capsularis, calyx-tubus fructifer obconicus glaber 2 mm. longus basi 1 mm. latus apice 2 mm. latus pentagonus coriaceus, lobis calycis patentibus crassissimis triangulari-cuspidiformibus 2 mm. longis 1 mm. latis apice acutis castaneo-coloratis basi haud contractis inter lobos callo singulo instructis, sinibus inter lobos obtusissimis; tubus calycis fructiferi (i. e. capsula) apice operculo singulo dehiscens, operculo plano pentagono  $1\frac{1}{2}$  mm. in diametro crassissimo glabro ad centrum callo singulo rotundato notato glabro; capsula monosperma vel disperma. Semina semi-obovoidea 2 mm. longa  $1\frac{1}{2}$  mm. lata apice truncata basi obtusa fuscentia albo-punctata striata; testa coriacea; albumen paucum; embryo amplius, radícula infra tereti 1 mm. longa  $\frac{1}{4}$  mm. lata, cotyledonibus amplis plicato-convolutis rotundatis basi profunde cordatis.

HAB. Mt. Ritōzan, leg. T. KAWAKAMI, Aug. 1913; in montibus centralibus, leg. U. MORI, Aprili. 1911.

Near *Serissa fetida* COMM., but differs from it by the very much shorter corolla and the shorter oblong leaves, veins of which are not visible on the under surface. In *S. fetida*, the veins of the leaves are visible on both surfaces. Also near *Serissa democritea* BAILLON which I have never seen; yet according to a note given in FRANCHET'S "Pl. David." p. 154, the plant is "très voisine du *S. fetida* L., dont elle diffère seulement par sa corolle deux fois plus petite et dont le tube dépasse peu les dents calicinales que sont lancéolés-subulées et souvent ciliées sur les bords; dans le *S. fetida*, les dents du calice sont presque deux fois plus courtes que le tube de la corolle; les deux espèces mieux connues devront probablement être réunies. Varie à feuilles largement

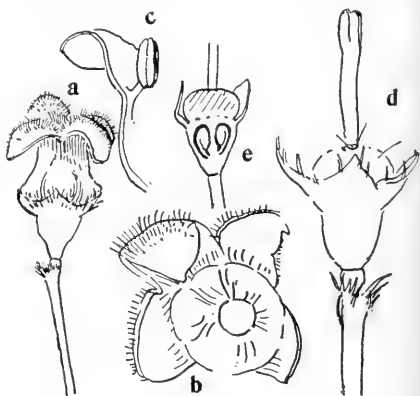


Fig. 19, *Litosanthes gracilis* HAYATA; a, a flower; b, corolla, seen from back; c, portion of corolla, seen from within; d, ovary and style, which is 4-lobed at the apex; e, vertical section of the ovary with a disc.



ovales-arrondies, ou à feuilles lancéolées." Our plant is different from the above species by the much longer corolla-tubes.

*Litosanthes* BLUME.

*Litosanthes gracilis* HAYATA (Fig. 19), Ic. Pl. Formos. II. p. 113.

*Galium* LINN.

*Galium gracile* BUNGE, (Fig. 20, a—h), HAYATA Ic. Pl. Formos. II. p. 102.

HAB. Mt. Shichiseitonzan, leg. T. KAWAKAMI et S. SASAKI, Aprili. 1911.

*Galium gracile* BUNGE forma *rotundifolia* (Fig. 20—i.)

HAB. Ins. Kelung, leg. S. SASAKI, Mai. 1910.

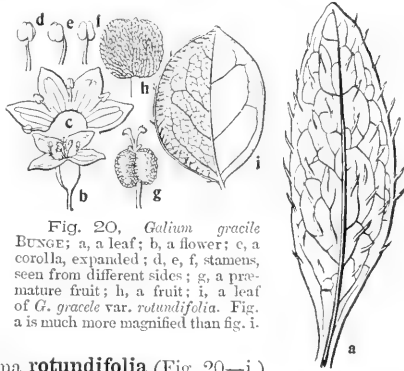


Fig. 20, *Galium gracile* BUNGE; a, a leaf; b, a flower; c, a corolla, expanded; d, e, f, stamens, seen from different sides; g, a premature fruit; h, a fruit; i, a leaf of *G. gracile* var. *rotundifolia*. Fig. a is much more magnified than fig. i.

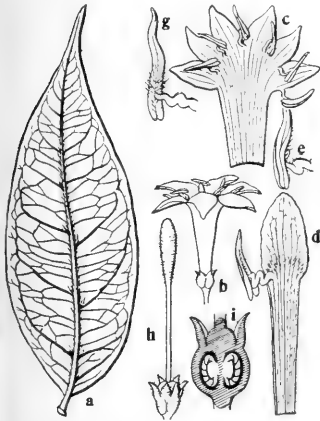


Fig. 21, *Thysanospermum diffusum* CHAMP., a, a leaf; b, a flower; c, corolla, expanded; d, portion of the corolla with a stamen; e, f, g, stamens, seen from different sides; h, ovary; i, section of the ovary; a, natural size; others more or less magnified.

*Thysanospermum* CHAMP.

*Thysanospermum diffusum*

CHAMP. (Fig. 21); BENTH. Fl. Hongk. p. 146; HAYATA Mater. Fl. Formos. p. 142.

HAB. Suisha, leg. B. HAYATA, Mai. 1912.

Our plant agrees pretty well with the description given in the Fl. Hongk. p. 146. In the description, there is mentioned "the leaves shortly stalked, ovate or ovate-lanceolate, acutely acuminate 1 to  $1\frac{1}{2}$  in. long."....."Peduncles axillary, solitary, 1-flowered, 2-3 lines long, with 2 minute bracts above the middle." In our specimen, the leaves are lanceolate, and much longer, usually  $2\frac{1}{3}$  in. long  $\frac{1}{2}$  in. wide, and peduncles are much longer, usually  $\frac{3}{4}$  in. long.

## Valerianeæ.

*Valeriana* LINN.

**Valeriana flaccidissima** MAX. HOOK. f. Fl. Brit. Ind. III. p. 211 : HEMSL. Ind. Fl. Sin. I. p. 398.

HAB. Mt. Arisan; inter Heishana et Nimandaira, leg. B. HAYATA, Aprili. 1914.

Compered with a Japanese specimen so labelled in the herbarium at Tōkyō.

**Valeriana Kawakamii** HAYATA sp. nov. (Tab. VIII.) Herba humilis 10–20 cm. alta glaberrima eramosa. Folia versus basin caulis oppositim approximativim sita longe petiolata, lamina ad rhachin pinnatisecta in ambitu obovato-spathulata 2–3 cm. longa 10–8 mm. lata, segmento terminali in ambitu ovato 1 cm. longo 10–7 mm. lato apice obtuso-acuto ↓-formiter hastato-trilobato basi cuneato, lobis obovato-oblongis, segmentis lateralibus oppositis obovato-oblongis 4 mm. longis 2 mm. latis apice acutis basi cuneatis herbaceis membranaceis, superioribus majoribus inferioribus minoribus, 2–4 mm. longis, segmentis totis integris margine ciliolatis utraque pagine pubescentibus vel demum subglabratiss, rhachibus petiolisque alatis cum alis  $\frac{3}{8}$  mm. latis, petiolis cum lamina æquilongis brevioribus vel longioribus basi dilatatis caulem semi-amplexantibus; folia superiora remotissima, juga folii a se 3–4 cm. remota. Caulis haud ramosus apice cyma singula terminatus. Cymæ 1–2 cm. longæ totiusque latæ, bracteis linearibus 4 mm. longis  $\frac{1}{2}$  mm. latis apice obtusis basi dilatatis caulem semi-amplexantibus basi auriculatis margine integris basi ciliolatis glabris sed basi hirsutis. Flores subsessiles dense dispositi. Calycis tubus plus minus oblique ovoides 1 $\frac{1}{4}$  mm. longus  $\frac{3}{8}$  mm. latus glaber 5-nervius, lobis obscuris involutis circ. 10. Corolla tubuloso-campanulata 2 $\frac{3}{8}$  mm. longa 1 $\frac{1}{2}$  mm. lata basi angustissime attenuata medio sursum dilatata apice 5-lobata plus minus obliqua, lobis oblongo-triangularibus  $\frac{2}{3}$  mm. longis totiusque latis apice obtusissimis basi plus minus dilatatis leviter patentibus glabris. Stamina 3, inclusa e medio corollæ oriunda, filamentis brevioribus 1 mm. longis inclusis glabris, antheris rotundatis  $\frac{1}{2}$  mm. longis totiusque latis glabris 2-locularibus, loculis distinctis, connectivis membranaceis latis tenuissimis, sed loculis antherarum se firme contactis. Stylus longe exsertus glaber 1–1 $\frac{1}{2}$  mm. longus apice

clavatis stigmatosis. Fructus ignotus.

HAB. in montibus centralibus, leg. T. KAWAKAMI et U. MORI, Aprili. 1910 (Fl.).

Near *Valeriana officinalis* LINN., but differs from it by the very much smaller leaves with entire leaflets.

## Goodenovieæ.

### *Scævola* LINN.

#### *Scævola hainanensis*

HANCE (Fig. 22), in Journ. Bot. (1878), p. 229; HEMSL. Ind. Fl. Sin. II. p. 2; DUNN et TUTCH. Fl. Kwangt. and Hongk. p. 151.

HAB. Kagi, leg. T. KAWAKAMI, Oct. 1913.

This very interesting plant accords nearly exactly with the original description of HANCE which is quoted as follows. "Frutescens, caulibus diffusis cortice glabro suberoso cinereo obtectis, ramulis novellis hirsutis, foliis sæpius fasciculatis spatulato-linearibus obtusis v. obtusiusculis glaberrimis 6-7 lin. longis 1-1½ lin. latis axillis cinereo-lanatis, floribus axillaribus solitariis sessilibus v. breviter pedunculatis bracteolis binis foliis homomorphis calycem duplo superantibus suffultis, calyce

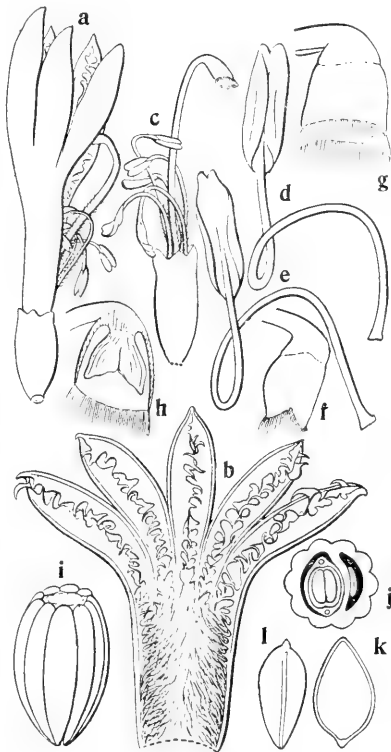


FIG. 22, *Scævola hainanensis* HAYATA; a, a flower,  $\times 3$ ; b, corolla, expanded along the lateral suture,  $\times 3$ ; c, a flower, corolla taken off, showing stamens and style,  $\times 3$ ; d, e, stamens seen from different sides; f, g, apical portion of the style, seen from different sides; h, vertical section of the same, showing the stigma; i, a fruit  $\times 7$ ; j, cross section of the same,  $\times 7$ ; k, l, a seed seen from different sides  $\times 7$ ; d, e, f, g, h, much more magnified.

glaberrimo  $1\frac{1}{2}$  lineali, lobis latis rotundatis tubo triplo brevioribus, corolla extus glabra 4-5 lin. longa, indusio ciliato." In addition to the description, he notes "An interesting plant, very closely allied to *S. spinescens* R. Br. ! from which, however, it seems truly distinct by its woolly leaf-axils, sessile or sub-sessile flowers, foliar bractlets and developed calyx-tube. It is only extra-Australian representative of the small section to which it belongs." HEMSLEY mentions, "We have not verified the genus of this by dissecting the flowers; but assuming it to be correctly referred here, it is a very distinct and interesting addition to the genus, especially in geographical range apart from the two widely spread species." I have dissected the flowers of my specimen and have ascertained that it is truly a species belonging to the genus *Scaevola*, as shown in the accompanying sketches.

### Vacciniaceæ.

#### *Vaccinium* LINN.

***Vaccinium emarginatum*** HAYATA Fl. Mont. Formos. p. 149; Ic. Pl. Formos. II. p. 115, t. 11. Descriptio auctata:—Calyx pallido-viridis sed apice rubescens; corolla pallido-lacticolorata ab apice usque ad basin late rubro-striata; antheris flavis.

HAB. Mt. Arisan, leg. B. HAYATA, Mart. 1914.

### Myrsinææ.

#### *Embelia* JUSS.

***Embelia penduliramula*** HAYATA sp. nov. (Tab. IX.) Frutex, cortice atro-fulvescenti, scandentissimus gracilis a basi trunci arboris usque ad summum scandens, ramis fere pendulis, ramulis perpendiculariter pendulis flexuosis fulvo-rubrescentibus subglabris sublaevibus vel tenuissime rugulosis lenticellatis, lenticellis verticaliter lentiforme-fusiformibus elevatis medio fissis circ. 1 mm. longis  $\frac{1}{2}$  mm. latis (in alio specimine ramulis longitudinaliter rugosis haud lenticellatis fusco-cinerascentibus), ramulis ultimis teretibus rubescentibus minute hirsutis, hornotinis basi usque ad  $1\frac{1}{2}$  cm. altitudinem haud foliatis sed squama lineari obtusa  $1\frac{1}{2}$  mm. longa remote alternatim 5-7 disposita instructis, pulvinis ad insertionem foliorum semi-annuliforme elevatis, cicatricibus foliorum

semi-rotundatis. Folia persistentia alterna in exsiccatō chartacea vel tenuiter coriacea in vivo crassiuscula fusco-viridia obovata 3–4½ cm. longa 1–2 cm. lata apice rotundato-obtusa ad summum tenuissime retusa basi cuneata ad basin angulum 40° formantia margine integra plus minus recurva utraque pagine glabra, costa supra tenuissime impressa subtus elevata, venis venulisque supra haud visis vel tenuissime elevatis subtus haud visis vel tenuissime elevatis, pagine subtus pallida, venis lateralibus primariis utroque latere 2–3, venis basilaribus a costa angulo 30° egressis, mediis superioribusque angulo 40° a costa egressis, venis venulisque gracillimis tenuissimis, petiolis 6 mm.–7 mm. longis intus profunde sulcatis angustissime alatis sub lente minute hirsutis vel subglabris. Racemi axillares vel laterales folia in longitudine æquantēs 2–4 cm. longi 1 cm. lati a ramulo divaricati patentissimi glanduloso-puberuli, pedunculis circ. 1 cm. longis basi remote perulatis, perulis bracteis conformibus elongato-triangularibus 1 mm. longis ½ mm. latis apice acutis castaneis, pedicellis alternis a se 2 mm. remotis 3–4 mm. longis glanduloso-puberulis basi 1-bracteatis, bracteis obovatis 1 mm. longis ⅔ mm. latis apice cuspidatis pallidis fusco-punctatis sed apice castaneo-coloratis glabris margine subintegris vel glanduloso-ciliolatis, pedicellis basi articulatis apice ad calycem abeuntibus. Flores monœcii. Fl. ♂: virides vel flavo-virides. Calyx patentissimus subplanus apice usque ad medium 4-lobatus, lobis oblongo-triangularibus ⅓ mm. longis totiusque latis apice acutis basi latissimis crassiusculis margine pauce glanduloso-ciliolatis fusco-punctatis subglabris. Corolla fere usque ad basin 4-fida, segmentis ovato-oblongis vel oblongis 2½ mm. longis 1½ mm. latis apice obtusis basi cuneatis ad basin ⅓–½ mm. latis margine tenuioribus extus subglabris fusco-punctatis intus densissime granulato-pulvereis basi erectis medio subito deorsum exteriore recurvis reflexis, sed ad summum interiore sursum leviter recurvis intus convexis extus concavis margine minute ciliolatis. Stamina 4 lobis corollæ opposita et iis affixa, filamentis basi lobi corollæ e ⅓ altitudine oriundis, partibus liberis 2 mm. longis longe exsertis erectis rectis dorso complanatis ⅓ mm. latis glabris, antheris ovato-oblongis ⅓ mm. longis ½ mm. latis apice obtusis basi 2-lobatis. Discus nullus. Rudimentum ovarii minutum ovoideum ¼ mm. longum, stylo recto erecto ¼ mm. longo glabro. Fl. ♀: virides haud patens semper semi-clausi. Calyx obconicus, lobis ut fl. ♂. Corolla haud patens, usque ad basin 4-fida, segmentis obovatis minus quam 2 mm.

longis  $1\frac{1}{4}$  mm. latis apice fere rotundatis vel obtusissimis basi subeuncatis extus glabris fusco-punctatis intus densissime granulato-pulvereis. Stamina lobis corollæ opposita et iis affixa, filamentis per totam longitudinem cum lobis corollæ connatis glabris, antheris sessilibus ad corollam adnatis ovato-oblongis  $\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice obtusis basi 2-lobatis. Ovarium globosum glabrum  $\frac{1}{2}$  mm. in diametro, stylo terminali oblique ?-formi erecto apice subito recurvo glabro. Ovarium 1-loculare pauci-ovulatum. Fructus globosus 5 mm. in diametro viridis leviter purpurascens tenuiter rugulosus 1-spermus. Semina ignota.

HAB. Mt. Arisan, inter Heishana et Nimandaira, ad 7000 ped. alt., leg. B. HAYATA, Aprili. (fl. et fr.) 1914.

Near *Embelia lata* Mez (= *E. obovata* HEMSL.), but differs from it in having much smaller leaves, in the filaments which are wrapped by the petals at the base, and in the petals which are hirsute in the inner side.

***Embelia lenticellata*** HAYATA sp. nov. Frutex scandentissimus. Rami et ramuli graciles teretes castanei subglabri vel brevissime hirsuti profuse lenticellati multi-striati, lenticellis fulvo-coloratis oblongis vel minute punctiformibus. Folia alterna oblonga vel oblongo-lanceolata circ. 9 cm. longa 3 cm. lata apice acuminata vel acuta sed ad summum obtusa basi obtusa vel rotundata margine obtuse serrulata vel obscure serrulata tenuiter coriacea vel coriaceo-membranacea utraque pagine glabra vel subglabra, costa supra impressa subtus elevata, venis lateralibus primariis utroque latere costæ 20-25 a costa angulo  $60^\circ$  egressis tenuissimis supra minus subtus plus elevatis reticulatis, petiolis 7 mm. longis supra sulcatis vix alatis, alis crispatis. Racemi 1-3 cm. longi brevissime hirsuti supra cicatrices foliorum siti solitarii, bracteis sub pedicello singulis tenuibus vel crassiusculis linearibus  $1\frac{1}{2}$  mm. longis apice obtusis utraque pagine brevissime hirsutis ferrugineis, pedicellis cum rhachibus articulatis 4 mm. longis brevissime ferrugineo-hirsutis. Fl. ♂ : sepala basi ad  $\frac{1}{4}$  coalita oblongo-rotundata  $\frac{1}{2}$  mm. longa et lata apice obtusa basi haud contracta margine sub lente minute glanduloso-denticulata intus glabra extus sub lente glanduloso-verrucoso-hirsuta. Petala fere distincta oblongo-oblancoolata 3 mm. longa  $1\frac{1}{4}$  mm. lata apice rotundata vel obtusa basi cuneato-angustata margine integra vel minute ciliolata intus minute verrucosa extus glabra levia, in flore apertienti deorsum a medio exteriori reflexo-patentissima. Stamina cum petalis æquilonga, filamentis

cum petalo ad  $\frac{3}{8}$  connatis glabris filiformibus, antheris oblongo-globosis  $\frac{1}{2}$  mm. longis vel longioribus totiusque latis vel minus latis apice leviter obtuse mucronatis basi 2-lobatis introrse dehiscentibus glabris. Rudimentum ovarii ampulliforme cum stylo 1 mm. longum  $\frac{1}{3}$  mm. latum glabrum. Fructus siccus globosus laevis 4 mm. in diametro stylo apiculatus.

HAB. Nantō : Suirikō, leg. U. MORI, Juli. 1907, (No. 3465); Taitō : Bunshiseki, leg. U. MORI, Dec. 1906, (No. 1841).

Near *Embelia oblongifolia* HEMS. (FORBES et HEMS. Ind. Fl. Sin. II. p. 62; MEZ Myrsinaceae, ENGLER'S Pfl.-reich p. 316), but differs from it by the petals which are entirely smooth on the back, and by the apiculate anthers. In *E. oblongifolia*, petals are papillose on both surfaces and anthers are emarginate.

#### *Rapanea* AUBL.

***Rapanea neriifolia*** (SIEB. et ZUCC.) MEZ Myrsinaceae in ENGLER Pfl.-reich p. 361.

*Myrsine capitellata* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 225 (non WALL.). This differs from *Rapanea capitellata* (= *Myrsine capitellata*) in having distinctly pedicellate flowers.

#### *Myrsine* LINN.

***Myrsine vacciniifolia*** HAYATA sp. nov. Frutex. Rami teretes recti, ramulis gracillimis dense ramosis dense foliatis hirsutis. Folia alterna rhomboideo-ovata vel -obovata 1 cm. longa 5 mm. lata apice triangulari-acuta breve aristata vel obtusa basi cuneato-acuta tenuiter coriacea margine aristato-serrulata, costa supra impressa subtus tenuiter elevata, venis utraque pagine tenuiter elevatis, petiolis circ. 1 mm. longis glabris. Flores minuti ad axillas foliorum 2-3-fasciculati brevissime pedicellati. Sepala (vel calycis lobi) 4 rarius 5 oblonga vel lineari-oblonga  $\frac{1}{2}$  mm. longa  $\frac{1}{4}$  mm. lata erecta plus minus interiore concava recta apice acuta vel obtusa basi plus minus contracta margine sursum glanduloso-contracta utraque pagine glabra utraque pagine rubro-elevato-punctata, sinibus inter sepala latis obtusissimis. Corolla persistens, tubo cylindrico-campanulato  $\frac{2}{3}$  mm. lato glabro, lobis triangulari-oblongis  $\frac{1}{2}$  mm. longis totiusque vel minus latis apice acutis basi latioribus margine glanduloso-denticulato-ciliolatis utraque pagine glabris utraque pagine rubro-elevato-punctatis. Sta-

mina 4 petalis opposita basin corollæ adnata, filamentis cum tubo corollæ connatis  $\frac{1}{3}$  mm. longis dilatatis complanatis triangularibus basi  $\frac{1}{4}$  mm. latis margine ciliolatis, antheris lanceolato-linearibus  $\frac{2}{3}$  mm. longis  $\frac{1}{3}$  mm. latis apice acuminatis. Ovarium ampulliforme apice rostratum cum rostris 1 mm. longum  $\frac{1}{2}$  mm. latum glabrum 1-loculare, placentis centralibus; stylo columniformi rostris ovarii articulado ad articulationem plus minus dilatato, stigmate ignoto. Fructus globosus 5 mm. in diametro siccus haud dehiscens; semina ignota.

Very near *Myrsine africana* LINN. (MEZ Myrsinaceæ in ENGLER Pfl.-reich p. 340, fig. 58) in its habit, leaves and flowers, but differs from it in having much smaller flowers with much narrower linear stamens and ovary with a long beak which is articulated with the style. *M. africana* figured in MEZ's monograph has, perhaps by an error, ciliate or denticulate sepals and petals in the male flowers, but has entire sepals and petals in the female ones.

*Ardisia* GERTN.

**Ardisia citrifolia** HAYATA sp. nov. Suffrutex circ. 18 cm. altus; caules simplices haud vel vix ramosi. Folia subopposita vel alterna elongato-oblonga circ. 9 cm. longa circ. 3 cm. lata apice acuminata ad summum obtusa basi obtusa margine subintegra vel plus minus undulata supra glabra subtus brevissime glanduloso-hirsuta, costa supra tenuissime impressa subtus elevata, venis lateralibus supra planis haud elevatis subtus elevatis tenuissimis, prope marginem distincte punctata, petiolis 1 cm. longis hirsutis supra profunde sulcatis. Flores ignoti. Fructus umbellati, umbellis terminalibus simplicibus solitariis 8-10-radiatis longe pedunculatis, pedunculis erectis rectis nec recurvis nec cernuis fusco-tomentosis gracillimis apice foliis 1-2 instructis, pedicellis 6-7 mm. longis fusco-tomentosis; sepala fructifera basi ad  $\frac{1}{2}$  coalita triangulari-oblonga, partibus liberis 2 mm. longis 1 mm. latis apice obtusis basi haud contractis extus hirsutis intus glabris margine haud ciliatis integris. Bacca globosa rubra 7 mm. in diametro.

HAB. Tonroku, leg. T. SÖMA, Dec. 1910.

**Ardisia cornudentata** MEZ Myrsinaceæ, in ENGLER Pfl.-reich p. 144; HAYATA, Mater. Fl. Formos. p. 182.

The original description of MEZ is as follows:— "Ramuli graciles, glabri. Folia petiolis  $\pm$  4 mm. longis stipitata, obovata vel oblonga, basin versus



sensim acuta apice breviter acuta nervoque medio ultra marginem producto mucronata, margine dentibus sursum spectantibus foliis inferioribus minoribus creniformibus superioribus valde prominentibus corniculatim dentiformibus sursum uncinatis insignia,  $\pm$  60 mm. longa, 25 mm. lata, supra lævia subtus prominulo-costulata, punctulis prominulis dissitis ad marginem recurvulum nec crispatum haud crebrioribus prædita. Inflorescentiæ in ramulorum specialium, foliis  $\pm$  4 instructorum apice sessiles, nutantes, umbellatæ,  $\pm$  8-floræ, glabræ, foliis multo breviores, pedicellis  $\pm$  8 mm. longis; flores 7-7.5 mm. longi, glabri; sepala basi breviter coalita suborbicularia, latissime rotundata, dissite manifeste punctulata; petala basi breviter connata bene asymmetrica, subelliptica, oblique breviter acuminulata, sicut sepala punctata; atamina petalis non nisi paullo breviora, antheris sensim acutis, dorso punctatis, rimis apice poratim dilatatis dehiscentibus; ovarium ovoideum, læve."

**Ardisia** (subg. *Crispardisia*) **crispa** (THUNB.) A. DC.; MEZ Myrsinaceæ in ENGLER Pfl.-reich p. 208 fig. 22, var.?

*Ardisia crispa* HAYATA Fl. Mont. Formos. p. 180 (non ROXB.).

Differs from the Japanese specimens by the much narrower leaves and in the simple unbelled inflorescence, or if compound, the primary radius being very much shorter than the secondary ones.

**Ardisia formosana** ROLFE in Journ. Bot. XX. (1881) p. 358; MEZ Myrsinaceæ in ENGLER Pfl.-reich p. 105.

Very near *Ardisia Sieboldii*. The distinction between the two species *A. formosana* and *A. Sieboldii* given by Mez is as follows.

"Sepala triangularia ad  $\frac{1}{3}$  connata; antheræ fere sessiles.....*A. formosana*

Sepala ovata, libera; antheræ manifeste stipitatæ.....*A. Sieboldii*."

I have examined my very rich collections of *A. Sieboldii* and its allies from Formosa, but have never found any flower with sessile anthers. It is very probable that *A. formosana* was described from young flowers of *A. Sieboldii*.

**Ardisia** (subg. *Crispardisia*) **Konishii** HAYATA sp. nov. Frutex? Rami et ramuli validiusculi glabri pallido cinerascetes, cicatricibus foliorum et ramulorum notatis; ramulis specialibus floriferis 15-25 cm. longis gracilibus glaberrimis pallidissimis post anthesin a ramo solutis. Folia obovato-oblancoolata vel lanceolata circ. 12 cm. longa circ. 3 cm. lata apice breve acuminata vel cuspidato-

acuta sed ad summum obtusa margine cuneato-attenuata margine subintegra vel remotissime crenata chartacea utraque pagine glabra, costa supra tenuiter impressa vel haud impressa subtus elevata, venis lateralibus supra minus subtus plus elevatis gracillimis, venulis reticulisque sub luce transversa distincte visis, supra viridia subtus pallidissima, petiolis circ. 2 cm. longis angustissime alatis, alis crispatis glabris. Flores 2-plo umbellati vel simpliciter umbellati, umbellis ad apicem ramulorum specialium sitis, umbellis ordinis I. sessilibus, radiis ordinis I. circ. 3 cm. longis, pedicellis ultimis gracilibus 2 cm. longis glabris. Sepala 5 circ. ad  $\frac{1}{4}$  coalita, partibus liberis triangulari-oblongis  $2\frac{1}{2}$  mm. longis 2 mm. latis apice obtusissimis margine tenuissimis subhyalinis haud ciliolatis integerrimis glaberrimis basi haud contractis haud punctatis. Petala 5 basi ad  $\frac{1}{4}$  coalita ovato-lanceolata 8 mm. longa 3 mm. lata apice interiore convoluta-acuminata basi haud vel vix contracta integra glabra haud punctata. Stamina ad basin corollae affixa subsessilia lanceolata linearia  $4\frac{1}{2}$  mm. longa medio sursum attenuato-angustata apice acuminato-producta apice plus minus tortuosa. Ovarium globosum glabrum 1 mm. in diametro, stylo filiformi 7 mm. longo erecto glabro apice punctiformi.

HAB. Hainan, leg. S. KONISHI, Jun. 1909.

**Ardisia kotoensis** HAYATA Mater. Fl. Formos. p. 180. Descriptio aucta:—Fructus globosus 1 cm. in diametro.

HAB. Kōtōshō, Juli. 1912, leg. T. KAWAKAMI et S. SASAKI.

**Ardisia** (subg. *Crispardisia*) **kusukusensis** HAYATA sp. nov. Frutex, rami et ramuli recti glabri cinerascens apice dense foliati. Folia alterna approximata versus apicem sita oblanceolata 15 cm. longa  $3\frac{1}{2}$  cm. lata apice acuta vel breve acuminata basi longe cuneato-attenuata margine subintegra vel tenuiter remoteque crenata (sinibus crenarum  $\frac{1}{2}$ –1 cm. distantibus) chartacea utraque pagine glabra in exsiccato supra fuscentia subtus pallidissima, costa supra tenuissime sulcata subtus distincte elevata, venis lateralibus tenuissimis, margine ad sinus crenarum punctis elongatis singulis instructa, petiolis brevibus 5 mm. longis glabris. Flores umbellati, umbellis pedunculatis ad axillas foliorum superiorum sitis, pedunculis 1–2 cm. longis glabris, radiis vel pedicellis 8 mm. longis. Sepala 5 basi plus minus coalita lanceolata 3 mm. longa  $1\frac{1}{4}$  mm. lata apice acuta vel obtusa plus minus contracta margine tenuia minute denticulata

utraq.ue pagine glabra fusco-punctata. Petala 5 lanceolata basi plus minus coalita 6 mm. longa 2 mm. lata apice acuminata et acuminatissima basi angustata margine tenuia hyalina integra utraq.ue pagine glabra fusco-punctata. Stamina 5 subsessilia, antheris lanceolato-linearibus 4 mm. longis  $\frac{3}{4}$  mm. latis apice acuminatissimis basi emarginatis. Ovarium globoso-conicum 1 mm. in diametro apice conico-acutum glabrum fusco-punctatum, stylo filiformi 4 mm. longo glabro, stigmate punctiformi.

HAB. KUSUKUSU, leg. B. HAYATA et S. SASAKI, Juni. 1912.

**Ardisia Oldhami** MEZ Myrsinaceæ in ENGLER Pfl.—reich p. 148.

HAB. Loco non indicato.

“Ramuli florigeri graciles, glabri. Folia petiolis  $\pm$  6 mm. longis stipitata, anguste elliptica, basi peracuta apice breviter acuminata, margine plana,  $\pm$  120 mm. longa, 40 mm. lata, membranacea, glabra, subtus prominulo-costulata tenuiter reticulata, punctis  $\infty$  maculiformibus picta. Inflorescentiæ in ramulorum specialium sursum foliis 2-3 auctorum apice terminales, sessiles, submultifloræ, ex umbella pauciflora centrali umbellisq.ue 4-5 lateralibus bene stipitatis compositæ, glabræ, foliis satis breviores, pedicellis validiusculis, 13-20 mm. longis. Baccæ immaturæ globosæ sepalis elliptico-lingulatis, acutiusculis vel anguste rotundatis insidentes.”

Not yet represented in our herbaria.

**Ardisia quinqueгона** BLUME; MEZ Myrsinaceæ in ENGLER Pfl.—reich p. 108. *Ardisia pentagona* A.DC.; HAYATA et MATSUM. Enum. Pl. Formos. p. 226.

Widely distributed in Formosa.

**Ardisia radicans** HEMSLE. et MEZ Myrsinaceæ in ENGLER Pfl.—reich p. 146. “Ramuli graciles, glabris. Folia petiolis  $\pm$  6 mm. longis stipitata, elliptica vel anguste elliptica, utrinque acuminata,  $\pm$  160 mm. longa, 55 mm. lata, membranacea, præter lepides paucas minutissimasq.ue subtus dissitas glabra, lacte viridia, subtus prominulo-costulata reticulataq.ue. Inflorescentia submultiflora, ex umbella centrali sessili umbellis paucis (2-4) lateralibus longe pedunculatis radiantibus composita bipinnatim paniculata, glabra, foliis brevior, pedicellis umbellæ centralis  $\pm$  20, lateralium vix ultra 15 mm. longis, umbellis omnibus involucri bractearum late ellipticarum, membranacearum, valde punc-

tatarum 3–4 mm. longarum insignibus; flores ante anthesin peracuti 6–7 mm. longi, glabri; sepala basi breviter connata, bene elliptica rotundata, membranacea; petala basi brevissime coalita paullo asymmetrica, e late ovato acuminata, tenuissime membranacea, punctis dissitis parvis aterrimis picta; stamina petalis bene breviora, antheris maximis subsessilibus; ovarium ovoideum.”

Near *Ardisia crispa* A. DC., but differs from it in having compound umbels, the radius of the second umbels being very much elongated. Not yet represented in our herbaria.

**Ardisia remotiserrata** HAYATA Mater. Fl. Formos. p. 183. Descriptio auctata: Alabastrum florum 7 mm. longum 2 mm. latum subteres apice acuminatum. Sepala rotundata basi plus minus coalita  $1\frac{1}{2}$  mm. in diametro margine capitato-ciliolata utraque pagine glabra. Petala basi plus minus coalita; tubo corollæ 1 mm. longo, lobis corollæ oblongis  $6\frac{1}{2}$  mm. longis  $2\frac{1}{2}$  mm. latis apice acutis vel obtusis basi haud contractis margine integris præter marginem nigro-punctatis utraque pagine glabris. Stamina cum petalis æquilonga vel breviora linearia 5–6 mm. longa 1 mm. lata apice acuminatissima fere sessilia. Ovarium conico-globosum læve glabrum apice actum ad stylum abeuns  $1\frac{1}{3}$  mm. longum 1 mm. latum, stylo filiformi cum petalis æquilongo.

HAB. Kōshūn: Kuraru, leg. B. HAYATA, Juni. 1912 (fl.).

**Ardisia stenosepala** HAYATA sp. nov. Frutex vel suffrutex. Rami castanei rugosissimi cicatricibus foliorum et ramulorum notati. Folia ad apicem rami approximativè sita lanceolata vel oblanceolata circ. 12 cm. longa  $3\frac{1}{2}$  cm. lata apice acuminata basi attenuato-cuneata margine remote mucronato-serrata, serris mucroniformibus a se 5–8 mm. remotis, sub mucrone punctis elongatis utraque pagine elevatis instructa membranaceo-coriacea utraque pagine glabra, costa supra tenuiter impressa subtus elevata, venis lateralibus supra haud visis haud elevatis subtus tenuiter elevatis gracilibus, petiolis 7 mm. longis angustissime alatis, alis crispatis. Flores ignoti. Fructus umbellati, umbellis simplicibus vel rarius plus minus compositis sessilibus ad ramulos speciales laterales terminalibus solitariis cernuis. Umbella circ. 10-radiata, toro 3 mm. longo pulvinis sub pedicello valde elevatis notato, bracteis nullis, pedicellis (radiis) breve hirsutis sursum dilatatis. Sepala fructifera basi brevissime coalita oblonga

oblongo-linearia  $2\frac{1}{2}$  mm. longa apice obtuso-acuta intus extusque glabra margine denticulata parve nigro-punctata, sinibus inter sepala obtusissimis vel rotundatis. Bacca rubro-coccinea 7 mm. in diametro in exsiccatō-nigro-punctata.

HAB. Mt. Arisan: Funkiko, Jan. 1912.

Near *Ardisia cornudentata* MEZ; but distinguishable from it by the linear sepals. In *A. cornudentata*, the sepals are "basi breviter corallita suborbicularia, latissime rotundata."

***Ardisia suishaensis*** HAYATA sp. nov. Suffrutex circ. 20 cm. longus gracilis eramosus. Caulis simplex rufescens crispato-hirsutus rubro-castaneus teres 2 mm. in diametro. Folia alterna laxè disposita obovato-lanceolata vel oblanceolata 8 cm. longa 3 cm. lata apice cuspidato-acuminata basi cuneato-obtusa margine mucronato-serrata, serris mucroniformibus a se 3 mm. remotis, prope apicem basique integra tenuiter coriacea, costa supra impressa subtus elevata, venis lateralibus supra haud vel vix visis subtus tenuiter elevatis gracilibus, pagina supra glabra subtus subglabra sub lente rubro-lepidoto-punctata, costa subtus rubro-hirsuta, margine sub mucrone fusco-elongato-punctata, punctis supra impressis subtus elevatis. Flores simpliciter vel plus minus compositim umbellati, umbellis sessilibus pauci-radiatis, radiis vel pedicellis sparse fulvo-tomentosis 7-8 mm. longis. Sepala basi leviter coalita oblongo-rotundata 2 mm. longa totiusque lata apice obtusa basi plus minus contracta utraque glabra margine ciliolata nigro-punctata. Petala nigro-punctata basi ad  $\frac{1}{2}$  coalita elongato-oblonga glabra 6 mm. longa  $2\frac{1}{2}$  mm. lata apice obtusa basi plus minus contracta margine integra. Stamina sessilia  $4\frac{1}{2}$  mm. longa  $1\frac{1}{2}$  mm. lata apice acuminata basi latiora. Ovarium conico-globosum glabrum 1 mm. longum, stylo erecto filiformi 4 mm. longo glabro. Fructus ignotus.

HAB. Suisha, Mai. 1912, leg. B. HAYATA et S. SASAKI.

Near *Ardisia cornudentata* MEZ, but differs from it by the terminal very short sessile umbels.

## Styraceæ.

### *Symplocos* LINN.

***Symplocos adinandrifolia*** HAYATA (Fig. 23) sp. nov. Frutices? Ramuli graciles teretes fusco-nigricantes subglabri. Folia tenuiter coriacea vel mem-

branaceo-coriacea lanceolata 11 cm. longa 28 mm. lata apice acuminata, acuminibus linearibus 2-3 mm. latis, basi cuneata margine integra vel mucronibus 1-2 utroque latere instructa, pagine utraque glabra, in exsiccatō supra fusco-nigricantia subtus fusco-rubescens, costa supra tenuiter impressa subtus tenuiter elevata, venis lateralibus primariis supra haud subtus tenuiter elevatis gracillimis angulo  $45^\circ$  a costa divaricatis utroque latere costae 7-8 subarcuatis, venulis supra haud visis subtus tenuissime elevatis gracillimis, petiolis 5 mm. longis  $1\frac{1}{2}$  mm. latis intus sulcatis extus convexis glabris angustissime alatis. Spicæ brevissimæ axillares, vel flores ad axillas foliorum glomerati, bracteis sub flore singulis rotundatis  $2\frac{1}{2}$  mm. longis totiusque latis extus brevissime ferrugineo-hirsutis intus glabris apice obtusis, pedicellis subnullis, bracteolis sub flore singulo duabus ad basin calycis sitis intus glabris rhomboideo-rotundatis 2 mm. longis plus quam 2 mm. latis apice obtusis basi plus minus contractis extus brevissime hirsutis basi dense hirsutis (pilis ferrugineis) dorso plus minus crassis subcarinatis vel haud carinatis. Calyx glaber obconico-campanulatus 4 mm. longus 5 mm. latus, tubo obconico 1 mm. longo ad orem  $1\frac{1}{2}$  mm. in diametro, limbo 3 mm. longo ad medium 5-lobato, lobis rotundato-triangulari-oblongis 2 mm. longis  $1\frac{1}{3}$  mm. latis apice rotundatis basi haud contractis utraque glabris. Corolla purpurascens obconico-campanulata 6 mm. longa, tubo 1 mm. longo, lobis ovato-oblongis vel oblongis  $5\frac{1}{2}$  mm. longis 4 mm. latis glabris apice obtusissimis basi  $\pm$  contractis margine integris. Stamina

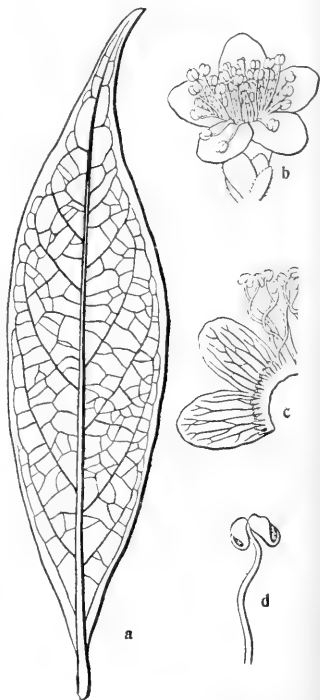


Fig. 23, *Symplocos adinandriifolia* HAYATA; a, a leaf; b, a flower; c, corolla, expanded, partly taken off, stamens partly cut off; d, a stamen.

indistincte pentadelphæ, filamentis complanato-teretibus glabris vel basi obscure paucissime barbatis vel haud barbatis. Ovarium apice disco brevissime annuliformi glabro coronatum 3-loculare, stylo recto columnari-filiformi 6 mm. longo glabro apice plus minus dilatato stigmatifero.

HAB. in montibus centralibus, leg. U. MORI.

Very near *S. cuspidata* BRAND (in ENGLER Pfl.-reich Symplocaceæ p. 69, n. 185). So far as I can judge from the original description of BRAND, I can not detect any difference between this and my species, except the leaves which are in our plant are a little narrower. As BRAND's description is very short and gives no account about the venation of the leaves, it is at present impossible to decide whether the two are the same or not.

**Symplocos adinandrifolia** HAYATA var. **theifolia** HAYATA n. v. (Fig. 24). Frutex? ramulis gracilibus fusco-nigricantibus tenuiter longitudinaliter rugulosis glabris remote foliatis. Folia lanceolata vel oblanceolata 12 cm. longa 33 mm. lata apice acuminata vel cuspidato-acuminata ad summum breve aristata basi cuneato-attenuata margine (basibus acuminibus exceptis) serrulata, serrulis remotis interdum ad mucronem reductis, mucronibus rubro-punctiformibus, costa supra impressa subtus prominente elevata, venis venulisque supra tenuiter impressis subtus gracillimis elevatis reticulatis, venis lateralibus primariis utroque latere costæ 5-6 angulo 45°-40° a costa egressis, pagine utraque glabra, petiolis 4-5 mm. longis glabris intus sulcatis subtus convexis. Flores ut typicæ.

HAB. Kuraru, leg. H. INABA, Aug. 1911.

Differs from the type by the remotely serrulate and a little broader leaves. As the leaves are subject to some variation, the variety may be a mere form of the type. I could not detect any difference between the flowers of the variety

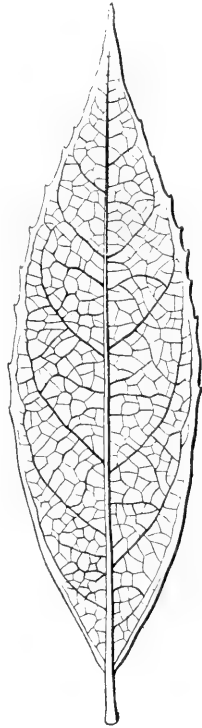


Fig. 24, *Symplocos adinandrifolia* HAYATA var. *theifolia* HAYATA.

and the type.

**Symplocos Doii** HAYATA (Fig. 25-b) Frutex? ramulis gracillimis glabris fuscentibus remote foliatis. Folia ovato-oblonga ovato-lanceolata 7 cm. longa 23 mm. lata apice acuminata vel caudato-acuminata ad summum aristata basi acuta cuneata ad extremitatem semper subito acuta ad petiolum abeuntia plus minus obliqua margine integerrima vel subintegra, costa supra tenuiter elevata per medium tenuissime sulcata subtus plana haud elevata, venis lateralibus utroque latere costæ 12-13 a costa angulo 50° egressis supra tenuissime elevatis gracillimis subtus tenuissime elevatis vel haud elevatis, pagine utraque glabra supra in exsiccatō viridia subtus pallidissima coriaceo-membranacea, petiolis 4 mm. longis glabris intus concavis dorso convexis. Flores ignoti. Fructus ellipticus plus minus obliquus 11 mm. longus 6 mm. latus basi contractus apice plus minus contractus ad orem 2 mm. in diametro glaber apice calycis lobis  $1\frac{1}{2}$  mm. longis oblongis apice rotundatis margine ciliatis pagine glabris coronatus ad apicem haud hirsutus 3-locularis; semina ignota.

HAB. Rinkihō, leg. T. Doi, 1912, Fr.

Resembles *Symplocos cuspidata* BRAND (ENGL. Pfl.-reich Symplocaceæ, p. 69, n. 185) by the leaves which are thinly coriaceous, lanceolate, entire, glabrous, long-cuspidate at the apex and cuneate at the base, but widely different from it by the very much smaller leaves; also near *Symplocos confusa* BRAND, but distinguishable from it in having thinner caudate leaves and by the slenderly stalked fruits with oblong calyx-lobes.

**Symplocos divaricativena** HAYATA sp. nov. (Fig. 25-g). Arbor? ramis fusco-cinerascentibus, cortice longitudinaliter ruguloso, lenticellis lentiformibus  $\frac{1}{2}$  mm. longis verticaliter dispositis. Folia lanceolato-oblonga 7 cm. longa 22 mm. lata apice breve cuspidato-acuminata vel breve acuminata ad summum obtusa basi acuta vel cuneato-acuta margine subintegra vel acuminibus basibusque integris exceptis obscure tenuiter serrulata, serrulis fere obsoletis, chartaceo-coriacea vel tenuiter coriacea, costa supra tenuiter impressa subtus elevata, venis utraque pagine tenuiter elevatis rectis, venulis haud vel vix visis, utraque pagine glabra subtus pallida, venis primariis lateralibus utroque latere costæ 9-10 a costa angulo 45°-50° egressis rectis, petiolis 12 mm. longis glabris intus concavis extus convexis. Flores non visi. Spicæ fructiferae axillares solitariae, rhachibus



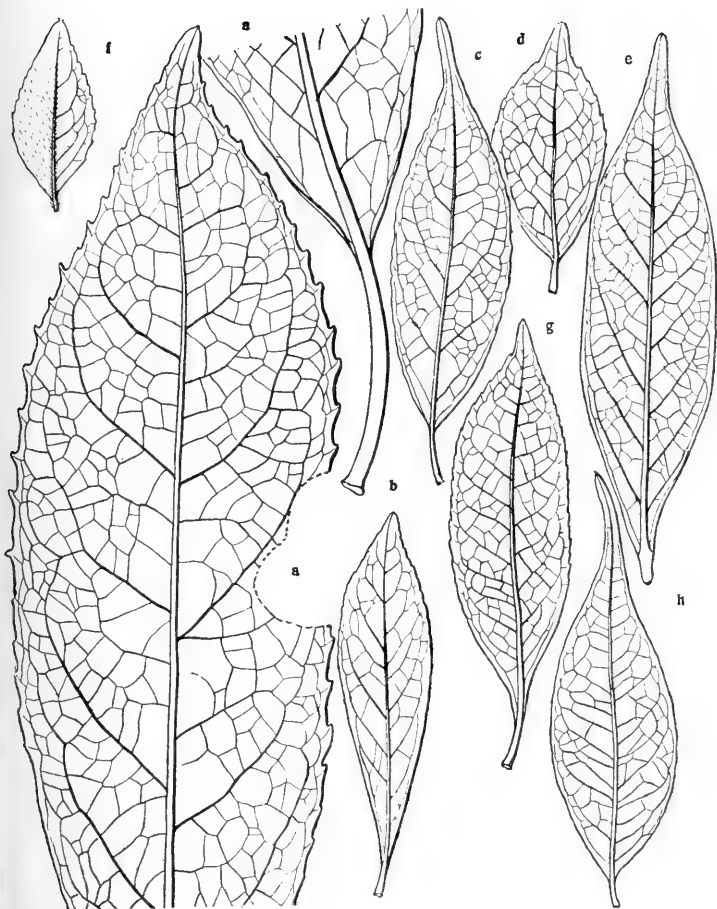


Fig. 23; a, *Symplocos Konishii* HAY.; b, *Symplocos wickstroemiifolia* HAY.; c, *Symplocos eriostroma* HAY.; d, *Symplocos macrostroma* HAY.; e, *Symplocos Nakaii* HAY.; f, *Symplocos thrichoclada* HAY.; g, *Symplocos divaricatirena* HAY.; h, *Symplocos Doii* HAY.

validiusculis. Fructus sessilis globosus præmaturus 4 mm. longus apice grosse apiculatus, apiculis globosis 1 mm. in diametro basi calycis lobis semi-rotundatis triangularibus  $\frac{2}{3}$  mm. longis instructis, lobos calycis superantibus.

HAB. Mt. Morrison, ad 7500 ped. alt., leg. U. MORI (No. 1729), Oct. 1906.

Resembles *Symplocos spicata* ROXB. in the spicate sessile globose fruits, but differs from it by the very much smaller oblongo-lanceolate leaves with very different venation.

***Symplocos eriobotryæfolia* HAYATA** sp. nov. (Tab. X. et Fig. 26).

Arborescens? Ramuli recti validiusculi, cortice fusco-rubescenti glabro, latere profuse glomerulos florum gerentes per totam longitudinem foliati teretes. Folia coriacea lanceolata lineari-lanceolata vel oblanceolata apice subito acuta vel acuminata ad summum obtusa basi obtusa 12 cm. longa 28 mm. lata margine integra plus minus recurva vel obscure remotissime mucronibus instructa, costa supra impressa subtus prominente elevata, venis supra impressis subtus tenuiter elevatis, arcolis inter venas laterales supra elevatis convexis subtus impressis concavis, venis lateralibus primariis utroque latere 9-10 angulo 45° a costa divaricatis, venulis supra subtusque vix vel haud visis, pagine utraque glabra supra viridia subtus pallidissima, petiolis 2 cm. longis triquetris intus concavis vel sulcatis dorso triangulari-convexis ad angulo acutis in exsiccatō rubro-purpurascētib. Flores radiatim 20-30-glomerati, glomerulis in ramo laterali defoliato lateraliter sitis perfecte sessilibus; bractea sub flore singulo unica triangulari-rotundata  $2\frac{1}{2}$  mm. longa totiusque lata intus glabra margine integra interdum 2-3 mucronibus majoribus  $\frac{1}{2}$  mm. longis instructa extus dense ferrugineo-rubro-tomentosa dorso haud carinata, bracteolis sub flore

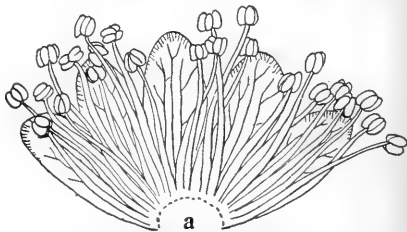


Fig. 26, *Symplocos eriobotryæfolia* HAYATA; a, corolla, expanded  $\times 3$ .

singulo duabus subrotundatis quam bractea minoribus  $2\frac{1}{2}$  mm. longis totiusque latis intus glabris margine integris extus dense ferrugineo-tomentosis dorso distincte carinatis. Calyx late obconicus 3 mm. longus 4 mm. latus intus glaber

extus sursum dense rubro-ferrugineus dense tomentosus cæterum glaber margine dense tomentosus, tubo obconico plus 1 mm. longo 2 mm. lato glabro, limbo 2 mm. longo leviter vel modice 5-lobato, lobis late semi-rotundatis 1 mm. longis 2 mm. latis apice perfecte rotundatis basi vix vel haud contractis. Corolla alba vel albo-flavescens obconica vel cylindrico-obconica 7 mm. longa alte 5-lobata vel fere partita, partibus vel lobis oblongo-spathulatis 7-6 mm. longis 3 mm. latis apice perfecte rotundatis basi plus minus angustatis utraque glabris sursum concavis margine integris longe ciliatis. Stamina distincte pentadelfa pauciora 23-25, filamentis valde complanatis  $\frac{1}{2}$  mm. longis sursum acuminatis basi corolla usque ad 2 mm. adnatis glabris. Ovarium 3-loculare, stylo 9 mm. longo glabro basi disco cylindrico  $\frac{2}{3}$  mm. longo glabro suffulto.

HAB. Rinkiho, leg. T. Doi; Mt. Arisan, inter Heishana et Nimandaira ad 6500 ped. alt., leg. B. HAYATA, Aprili. 1914.

Near *Symplocos nerifolia* S. et Z., but distinctly different from it in having much narrower leaves with very much impressed costa and veins and very much elevated areas between the veinlets on the upper surface.

**Symplocos eriostroma** HAYATA sp. nov. (Fig. 25-c). Frutex, ramis fuscentibus, cortice longitudinaliter ruguloso, ramulis gracillimis flexuoso-recurvatis teretibus viridescentibus vel flavescentibus glabris, ramulis ultimis gracillimis 1 mm. in diametro sectionis remote foliosis plus minus angulatis. Folia oblongo-lanceolata vel oblanceolata vel ovato-lanceolata 8 cm. longa 2 cm. lata apice subito acuminata vel caudato-acuminata ad summum obtusa ad centrum summorum obscure mucronata basi cuneato-acuta vel cuneato-attenuata margine (basibus acuminibus integris exceptis) crenulata, acuminibus linearibus 2 mm. latis, utraque glabra membranacea vel coriaceo-membranacea, costa supra tenuissime impressa subtus elevata, venis lateralibus primariis tenuissime supra minus subtus plus elevatis utroque latere costæ 6-7 angulo 40° a costa egressis, venulis tenuissime utraque pagine elevato-reticulatis, reticulis obscuris, in exsiccato pallido-viridescencia subtus pallidiora, petiolis gracilibus 9-8 mm. longis teretibus intus profunde sulcatis. Gemmæ spicæ floriferae axillares solitariae sericeo-albescentes subglobosæ 7 mm. longæ totiusque latæ brevissime pedicellatæ, pedicellis  $\frac{1}{2}$  mm. longis, basi 2-perulatæ, perulis brevissimis late rotundatis 1 mm. longis 2 mm. latis subglabris margine ciliolatis viridibus; perulæ floriferae

(i. e. bractee) obovato-rotundatæ 5 mm. longæ totiusque latæ extus dense villosæ intus glabræ apice rotundatæ vel emarginatæ basi plus minus cuneatæ vel cuneato-contractæ margine integræ sed dense longe ciliatæ sub flore singulo unicæ; bracteolis sub flore duabus subulato-linearibus  $2\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis extus dense villosis intus glabris; rhachibus spicæ pedicellis florumque dense villosis. Calyx perfecte glaber campanulatus  $1\frac{1}{2}$  mm. longus totiusque latus, tubo  $\frac{1}{2}$  mm. longo circ. 1 mm. lato, limbo perfecte 5-partito, lobis glabris oblongis vel ovatis apice obtusis margine subintegræ haud ciliolatis vel interdum basi ciliolis 1-2 instructis. Corolla alte 5-loba, lobis suboblongis margine obscure erosis haud ciliolatis. Stamina sublibera distincta pauca 25, filamentis glabris. Ovarium 3-loculare apice discis viridibus planis coronatum, stylo columniformi, stigmate terminali haud lobato.

HAB. Montibus centralibus, Arisan ad 5000 ped. alt., leg. S. SASAKI, Jan. 1911, (No. 2), (Alabastris florum).

Near *S. argentea* BRAND (in ENGLER Pfl.-reich, Symplocaceæ p. 67, n. 174), but differs from it by the much smaller leaves.

**Symplocos glomeratiflora** HAYATA sp. nov. (Fig. 27). Arbor? Rami validiusculi, cortice fusco-purpureo-glabro cicatricibus foliorum notato, ramulis in exsiccato flavescentibus complanato-angulatis glabris remote foliatis 3 mm. latis. Folia oblongo-lanceolata vel rhomboido-lanceolata  $8\frac{1}{2}$  cm. longa 3 cm. lata apice acuminata vel caudato-acuminata basi caudato-acuminata margine basibus acuminibus integris exceptis remote crenulato-serrulata, serrulis brevissimis, pagine utraque glabra in exsiccato supra nitida pallido-flavescentia subtus pallidissima vix vel haud glaucescentia, costis venis venulisque utraque pagine elevatis, venis lateralibus primariis tenuissimis gracilibus angulo acuto a costa divaricatis, petioli 14 mm. longis angustissime alatis intus planis vel concavis subtus convexis. Flores ad axillas dense glomerati dense bracteati, bracteis valde concavis margine brevissime

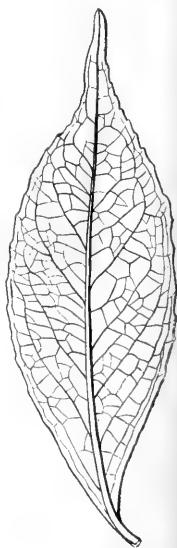


Fig. 27, *Symplocos glomeratiflora* HAYATA.

ciliolatis intus glabris extus brevissime hirsutis late rotundatis  $1\frac{2}{3}$  mm. longis 2mm. latis vel latioribus margine tenuibus versus medium crassiusculis. Flores apertientes ignoti. Alabastrum florum visum. Calyx glaber obconicus, tubo obconico 1mm. longo, limbo campanulato 5-lobato, lobis utraque glabris triangulari-semirotundatis 1mm. longis totiusque latis vel latioribus apice rotundatis margine ciliolatis tenuibus versus medium crassiusculis. Corolla apertiens ignota. Stamina distincte pentadelphica, filamentis glabris. Ovarium 3-loculare apice dense hirsutum, stylo hirsuto.

HAB. Arisan, leg. S. SASAKI, 1911, Mart.

Near *S. glomerata*, but differs from it by the densely clustered flowers.

**Symplocos heishanensis** HAYATA sp. nov. (Fig. 28). Arbor. Rami et ramuli graciles, cortice fusco- vel cinerascenti irregulariter longitudinaliter ruguloso minute lenticellato, lenticellis rotundatis elevatis  $\frac{3}{8}$  mm. in diametro, ramulis sursum subtragonis gracilibus glabris. Folia lanceolata oblanceolata 10 cm. longa  $2\frac{1}{2}$  cm. lata apice cuspidato-acuminata ad summum obtusa basi cuneata vel acuto-cuneata margine subintegra vel sursum obscure minuteque serrulata, serrulis haud mucronatis vel obsoletis ad nullum reductis, chartacea vel chartaceo-coriacea, costa supra impressa subtus elevata vel utraque pagine elevata, venis supra haud elevatis subtus tenuiter elevatis, venulis supra haud visis subtus tenuissimis visis, venis lateralibus primariis utroque latere costae 11-12 angulo  $45^{\circ}$ - $40^{\circ}$  a costa egressis, supra in exsiccatto fuscentia subtus pallidiora, petiolis glabris intus concavis sulcatis extus convexis 8mm. longis. Racemi florum in axilla foliorum superiorum densiuscule dispositorum siti vel subterminales simplices 2-3 $\frac{1}{2}$  cm. longi basi remote sursum dense floriferi; rhachis racemi brevissime pubescens,

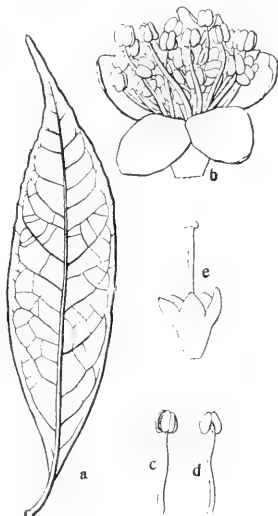


Fig. 28, *Symplocos heishanensis* HAYATA; a, a leaf; b, a flower; c, d, stamens, seen from different sides; e, calyx and style.

pedicellis 3 mm. longis; bracteis singulis basi pedicelli sitis caducissimis  $3\frac{1}{2}$ –4 mm. longis 3 mm. latis ovatis apice obtusissimis margine integris brevissime ciliolatis dorso medio parcissime hirsutis intus glabris basi plus minus contractis, bracteolis minutis ovato-oblongis 2 mm. longis  $1\frac{2}{3}$  mm. latis apice acutis intus glabris dorso parcissime hirsutis vel glabris margine integris ciliolatis dorso medio crassiusculis. Calycis tubus cylindrico-obconicus  $1\frac{1}{4}$  mm. longus apice 1 mm. in diametro, lobis 5 triangulari-rotundatis 1 mm. longis  $1\frac{1}{5}$  mm. latis apice triangulari-obtusis basi plus minus contractis margine minute ciliatis intus glabris extus subglabris. Corolla subrotata alte 5-lobata vel 7-lobata, lobis oblongis 4 mm. longis 3 mm. latis apice rotundatis basi plus minus contractis haud ciliolatis integris. Stamina  $\infty$  obscure pentadelpa filamentis glabris. Ovarium apice disco glabro plano cernatum, stylo 4 mm. longo glabro apice capitato.

HAB. Arisan, inter Nimandaira et Heishana, leg. T. Itō et B. HAYATA, Aprili. 1914; Nimandaira, leg. R. KANEHIRA et I. TANAKA, Aprili. 1914.

Very near *Symplocos rischiensis* HAYATA, but separable from it only by the narrower leaves and larger flowers. Also near *Symplocos arisanensis* HAYATA, but differs from it by the longer and entire lanceolate leaves. More closely allied to *Symplocos prunifolia* S. et Z., but distinguishable from it by the much narrower lanceolate more acuminate entire leaves and nearly sessile flowers.

***Symplocos ilicifolia* HAYATA sp. nov.** (Fig. 29). Arborecens. Rami ramulique validiusculi, cortice ramulorum fuscenti vel flavescenti, ramulis ultimis plus minus angularibus glabris remote foliatis. Folia ovato-oblonga oblonga 9 cm. longa  $3\frac{1}{2}$  cm. lata apice acuminata ad summum obtusa basi acuta vel obtuso-acuta margine tenuissime recurva vel haud recurva remote serrulata, serrulis brevissimis remotis, coriacea valde coriacea utraque glabra in exsiccatō flavescentia, costis venis venulisque utraque pagine elevatis grosse reticulatis, venis primariis lateralibus utroque latere

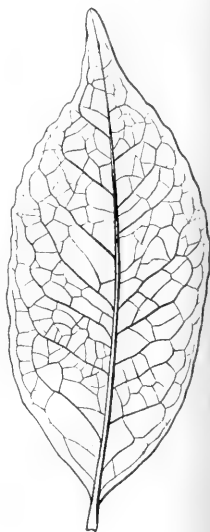


Fig. 29, *Symplocos ilicifolia* HAYATA.

costæ 9–10 rectis angulo  $45^{\circ}$ – $50^{\circ}$  a costa egressis, petiolis 4 mm. longis intus sulcatis vel planis dorso convexis glabris. Flores in axilla foliorum dense glomerati, pedicellis subnullis, bracteis sub flore singulo 6–9 late rotundatis 2 mm. longis  $2\frac{1}{2}$  mm. latis apice rotundatis basi contractis subintegris vel irregulariter crosis extus breviter hirsutis intus glabris. Flores apertientes ignoti. Fructus glaber obovoideo-ellipticus 5 mm. longus 4 mm. latus basi cuneato-contractus apice truncatus plus minus depressus ad centrum barbatus apice lobis calycis coronatus, lobis triangulari-semirotundatis  $1\frac{1}{2}$  mm. longis  $2\frac{1}{2}$  mm. latis apice rotundatis basi latissimis haud contractis intus glabris extus plus minus paucissime hirsutis margine brevissime ciliolatis; semina ignota.

HAB. Tōyen: Mt. Hakukotaizan, leg. U. MORI, Mart. 1907, (No. 2688), Fl.

Near *Symplocos congesta* BENTH. (Fl. Hongk. p. 211; BRAND in ENGL. Pl.-reich Symplocaceæ p. 89), but differs from that by the ovary which is hirsute at the apex. Also near *S. japonica* A. DC., but distinguishable from that by the caudately acuminate leaves.

**Symplocos japonica** A. DC. var. **Nakaharai** HAYATA n. v. Arborescens: rami fusco-nigricantes glabri, ramuli subcomplanate tetragoni angustissime vel haud alati in exsiccatō flavescentes glabri. Folia coriacea oblongo-lanceolata vel oblonga  $4\frac{1}{2}$  cm. longa  $1\frac{1}{2}$ –2 cm. lata apice breve acuminata vel caudata ad summum obtusa ad centrum summorum nigro-punctata basi cuneata vel cuneato-attenuata margine (basibus acuminibus integris exceptis) remote serrulata, serrulis utroque latere 3–4, in exsiccatō pagine supra nitida viridia subtus pallidissima margine desuper tenuissime recurva, costa supra tenuissime elevata subtus plus elevata, venis primariis lateralibus utroque latere costæ 4–5 angulo  $45^{\circ}$  a costa egressis supra tenuiter impressis subtus tenuiter elevatis venulis utraque pagine haud vel vix visis, petiolis 5 mm. longis intus sulcatis extus convexis. Flores brevissime spicati, spicis axillaribus, vel flores in axilla subglomerati subsessiles; rhachis apice parcissime brevissime hirsuta; bractea sub flore singula triangulari-oblonga  $1\frac{1}{2}$  mm. longa totiusque lata valde concava utraque glabra apice obtusissima basi haud contracta margine ciliolata, ciliis brevissimis; bracteolis sub flore singulo duabus quam bractea majoribus semiorbicularibus 2 mm. longis  $2\frac{1}{2}$  mm. latis apice obtusis vel rotundatis basi cordato-contractis margine brevissime ciliolatis tenuibus utraque glabris dorso crassiusculis in

medio distincte carinatis. Calyx late campanulatus, lobis 5 triangulari-semiorbicularibus 2 mm. longis 2 mm. latis basi plus minus contractis utraque glabris apice obtusissimis margine ciliolatis. Corolla campanulata alte 5-lobata, lobis oblongis vel rotundatis  $4\frac{1}{2}$  mm. longis 2-4 mm. latis apice obtusissimis vel rotundatis margine integris haud ciliolatis. Stamina indistincte pentadelphæ. Stylus filiformis basi plus minus dilatatus basi deorsum hirsutus. Fructus obovoideo-ellipticus vel ellipsoidens 7 mm. longus 4 mm. in diametro basi plus minus contractus apice truncatus apice ad centrum hirsutus ad apicem lobis calycis coronatus.

HAB. Loo-choo: Nagotake, leg. G. NAKAHARA, Aprili. 1907.

Differs from the type by the smaller oblong leaves. The leaves of the type are usually obovate.

**Symplocos** (§ *Hopea*) **Kawakamii** HAYATA sp. nov. (Fig. 30). Frutex. Rami superiores angulares, cortice glabro cinerascenti, ramulis superioribus angularibus ad angulos subulatis in exsiccatō flavescentibus, alis 1-2 mm. latis, ramulis ultimis verticillatim ramosis, ramulis terminalibus rectis dense foliatis angulato-alatis 4 mm. in diametro sectionis glabris. Folia oblonga vel rotundato-oblonga 4 cm. longa 3 cm. lata apice rotundata vel ad centrum leviter retusa vel haud retusa basi subrotundata vel rotundato-obtusa coriaceo-crasiuscula margine valde desuper recurvato-reflexa, partibus marginalibus reflexis 2-3 mm. latis, in exsiccatō viridi-flavescentia, costis venis venulisque supra valde impressis, subtus costa elevata, venis venulisque haud visis, supra nitida subtus pallido-opaca, venis lateralibus primariis utroque costæ latere 4 angulo 50° a costa divaricatis haud curvatis plus minus vel haud flexuosis, venulis et venis valde impressis reticulatis subtus haud reticulatis, petiolis 4 mm. longis totiusque latis subulatis subtus costatis, costis ad alam ramulorum abeuntibus. Spicæ brevissimæ pauci- vel 3-4-floratæ cum floribus 8 mm. longæ basi bracteate, bracteis spicæ triangularibus rotundato-triangularibus 2 mm. longis glabris margine ciliolatis basi latissimis crassiusculis, rhachibus angulatis subulatis. Flores sessiles vel breve pedicellati, bracteis sub pedicello brevissimis, bracteis florum sub flore singulo 3 approximatis sitis majoribus rotundato-triangularibus 2 mm. longis 3 mm. latis margine ciliolatis basi latis-



Fig. 30,  
*Symplocos*  
*Kawakamii*  
HAYATA;  
a, a petal.



simis dorso crassiusculis subcarinatis. Calyx latissime campanulatus glaber cum tubo limboque 3 mm. longus 5 mm. in diametro, tubo brevissimo obconico 1 mm. longo  $1\frac{2}{3}$  mm. ad apicem lato, limbo 5-lobato, lobis semiorundatis concavis  $1\frac{2}{3}$  mm. longis  $2\frac{2}{3}$  mm. latis apice rotundatis basi leviter contractis margine ciliolatis utroque glabris. Corolla alte 5-lobata interdum 7-lobata vel fere 5-partita, lobis vel partibus oblongis  $4\frac{1}{2}$  mm. longis 3 mm. latis concavis vel convexis apice obtusissimis basi contractis  $1\frac{1}{3}$  mm. latis margine integris sursum ciliolatis in exsiccato flavis. Stamina  $\infty$  obscure vel indistincte pentadelpa, filamentis glabris linearibus complanato-teretibus apice subito contractis in longitudine variabilibus, antheris cordato-reniformibus utrinque 2-lobatis. Ovarium 3-loculare perfecte inferius apice discis annuliformibus coronatum ad apicem planum hirsutum, stylo glabro erecto recto 2 mm. longo, stigmate terminali rubro-nigro-colorato obscure 3-lobato plus minus dilatato.

HAB. Bonin, leg. T. KAWAKAMI, Aug. Fl.

**Symplocos Konishii** HAYATA (Fig. 25, a-a') Arboreus? Ramuli validiusculi in exsiccato fusco-purpurascens, cortice minute longitudinaliter ruguloso-glabro. Folia oblongo-lanceolata vel lineari-oblanccolata 20 cm. longa  $5\frac{1}{2}$ -6 cm. lata apice subito acuta vel breve acuminata basi cuneato-acuta margine remote serrulata, serrulis a se 7 mm. remotis apice ascendentibus, coriacea utraque pagina glabra supra fusco-viridescens, subtus pallida in exsiccato flavescentia, costa supra tenuiter impressa sulcata subtus valde elevata, venis supra vix vel haud elevatis subtus tenuiter elevatis distincte visis, venulis supra vix elevatis subtus distincte tenuiter elevatis, venis lateralibus primariis utroque latere costæ 5-7 a costa angulo  $45^\circ$  egressis plus minus arcuatis prope margine se reticulatis, petiolis 4 cm. longis glabris fuscis intus planis vix vel haud sulcatis extus convexis. Flores ignoti. Fructus urceolato-globosus  $4\frac{1}{2}$  mm. longus totiusque latus. Bractea sub fructu singulo unica semi-orbicularis 3 mm. lata  $2\frac{1}{3}$  mm. longa intus glabra extus plus minus hirsuta apice rotundata basi contracta, bracteolis sub fructu singulo duabus cordato-semiorbicularibus 2 mm. longis 3 mm. latis intus glabris extus pauca hirsutis dorso medio carinatis margine ciliolatis.

HAB. in montibus Kussaku, 1907, Jun. (Fr.).

Near *Symplocos spicata* ROXB., but differs from it by the quite glabrous

oblanceolate leaves with different venation.

**Symplocos kotoensis** HAYATA sp. nov.

(Fig. 31). Arbriuscula; ramuli validiusculi glabri fuscentes, cortice minute longitudinaliter ruguloso. Folia coriacea ovato-oblonga vel oblonga 13 cm. longa 5 cm. lata apice subito breve acuminata vel cuspidata basi late cuneato-acuta vel obtuso-acuta margine subintegra vel obscure serrulata, costa supra tenuissime sulcata plus minus impressa subtus valde elevata, venis gracillimis supra vix vel haud elevatis subtus distincte elevatis, utraque pagine glabra, venulis reticulatis supra vix vel haud elevatis subtus tenuissime elevatis distinctis, venis lateralibus primariis utroque latere costæ 9-10 a costa angulo 45° egressis subarcuatis, petiolis 2½ cm. longis glabris intus planis vix sulcatis extus convexis.

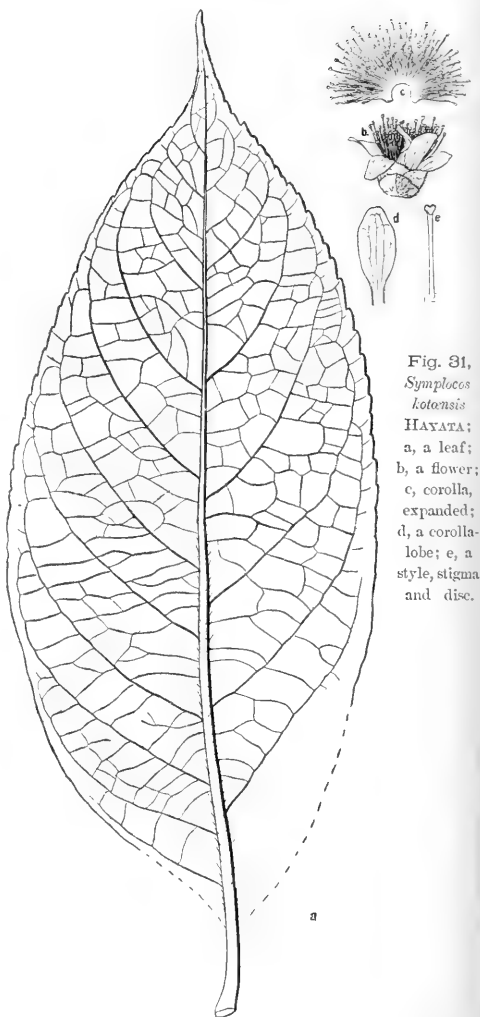


Fig. 31,  
*Symplocos*  
*kotoensis*  
HAYATA;  
a, a leaf;  
b, a flower;  
c, corolla,  
expanded;  
d, a corolla-  
lobe; e, a  
style, stigma  
and disc.

Spicæ floris axillares a basi pauci-ramosæ, ramis ascendentibus 6-7 cm. longis densiuscule floriferis brevissime ferrugineo-pubescentibus, bracteis sub flore singulo unicis subrotundatis  $2\frac{1}{2}$  mm. longis totiusque latis apice triangulari-acutis basi plus minus contractis margine ciliolatis intus glabris extus dense ferrugineo-tomentosis, bracteolis sub flore singulo duabus cum bractea conformibus basin calycis complete amplexantibus. Flores sessiles. Calyx extus ferrugineo-pubescent, tubo brevissimo  $\frac{1}{2}$  mm. longo 2 mm. lato, limbo 5-partito, partibus late rotundatis intus glabris apice triangulari-acutis margine dense ciliolatis basi leviter vix vel haud contractis intus glabris extus dense ferrugineo-pubescentibus. Corollæ tubus brevissimus  $\frac{1}{2}$  mm. longus, limbo patentissime 5-partito, partibus oblongis  $4\frac{1}{2}$  mm. longis 2-2 $\frac{1}{2}$  mm. latis glabris apice obtusissimis basi vel haud contractis. Stamina  $\infty$  indistincte pentadelphæ, filamentis glabris. Ovarium 3-loculare apice disco annuliformi  $\frac{1}{4}$  mm. alto coronatum, stylo 5 mm. longo glabro apice stigmatoso, stigmatate 3-loba.

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912.

Near *Symplocos spicata* ROXB., but differs from it by the shortly acuminate, quite glabrous, subentire leaves.

**Symplocos macrostroma** HAYATA sp. nov. (Fig. 25-d). Frutex, ramis ramulis rectis, cortice cinerascenti vel fusco-purpurascenti longitudinaliter ruguloso, teretibus glabris. Folia coriacea in exsiccatō flavescentia rhomboideo-oblonga vel obovato-oblonga  $4\frac{1}{2}$  cm. longa 2 cm. lata apice breve cuspidata ad summum obtusa ad centrum summorum obscure nigro-mucronata basi acuta vel cuneato-acuta margine desuper recurva tenuiter serrulata (acuminibus basibusque integris exceptis), venis venulisque supra tenuiter impressis subtus tenuiter elevatis, venis lateralibus primariis utroque latere costæ 4 angulo 45° a costâ egressis subtus tenuiter elevatis, venulis grosse reticulatis, reticulis supra tenuiter impressis subtus tenuiter elevatis, pagina utraque glabra, petiolis 4 mm. longis intus (supra) planis extus (dorso) convexis in exsiccatō flavescentibus. Spicæ 2-3 cm. longæ axillares solitariae laxè-floratæ, floribus a se 4-5 mm. remotis, sub flore singulo 1-bracteata et 2-bracteolata; rhachis spicæ cum pedicellis hirsuta, bracteis amplis oblongo-rotundatis 4-5 mm. longis 3-4 mm. latis apice rotundatis truncatis ad centrum minute apiculatis intus glabris extus brevissime hirsutis margine distincte ciliolatis coriaceis ad medium falcato-concavis alabastrum floris

complete amplexantibus; bracteolis ad basin calycis tubi sitis lanceolatis 2 mm. longis  $\frac{2}{3}$  mm. latis acutis margine ciliolatis margine deorsum pectinato-serrulatis intus glabris extus dorso subcarinatis ad carinam hirsutis. Calyx cylindrico-campanulatus glaber, tubo cylindrico-campanulato  $1\frac{1}{2}$  mm. longo apice  $1\frac{1}{2}$  mm. lato, limbo 5-partito vel lobato, lobis rotundato-oblongis  $1\frac{1}{3}$  mm. longis 1 mm. latis apice obtusis vel acutis basi leviter contractis utraque glabris margine ciliolatis. Corolla 5-partito-lobata, lobis oblongis. Stamina circ. 25 distincte vel obscure pentadelpa, filamentis glabris complanatis. Ovarium 3-loculare apice glabrum, stylo columniformi, stigmate obscure 2-3-lobato.

*Symplocos japonica* HAYATA Mater. Fl. Formos. p. 188 (non A. DC.).

HAB. Kappanzan, leg. U. MORI, Mart. 1907, (No. 2658) (Alabastro fl.).

Widely different from all the known species from Formosa in having manifestly bracteate spikes.

***Symplocos microcalyx*** HAYATA sp. nov. (Fig. 32). Frutex, ramulis superioribus gracilibus rectis teretibus fusco-purpurascentibus adpresse ferrugineo-hirsutis, pilis brevissimis, remote foliosis. Folia ovato-oblonga vel lanceolata 4-5 cm. longa 15-17 mm. lata, tenuiter coriacea apice acuminata ad summum obtusa ad centrum summi mucronata basi obtusa vel obtusissima supra nitida margine subintegra plana vel remote serrata, serris brevissimis utroque latere 2-3 instructis, basi acumineque integerrima, costa supra tenuiter impressa tenuiter brevissime hirsuta subtus elevata, venis lateralibus primariis supra haud visis subtus tenuissime elevatis gracillimis utroque latere costae 3-6 a costa angulo  $50^\circ$  vel  $45^\circ$  egressis, venulis haud visis, pagine supra glabra subtus ad costas pauce ferrugineo-hirtella, petiolis 2 mm. longis fusco-hirsutis intus concavis extus convexis. Spicae axillares solitariae circ. 2 cm. longae, floribus interioribus a se 1-2 mm. remotis; rhachibus spicae brevissime hirsutis, pedicellis brevissimis  $\frac{1}{3}$  mm. longis vel subnullis glabris, bracteis sub flore singulo triangulari-semirotundatis intus glabris margine ciliolatis  $\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis extus dense hirsutis apice subrotundatis fuscentibus, bracteolis sub flore singulo duabus ad basin calycis sitis subrotundatis  $\frac{2}{3}$  mm. longis totiusque latis apice subacutis margine ciliolatis extus subhirsutis

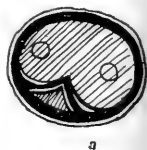


Fig. 32, *Symplocos microcalyx* HAYATA; a, cross section of a fruit, curved embryo is cut at two places.

vel subglabris dorso melio subcarinatis intus glabris. Calyx obconico-campulatus subglaber, tubo obconico  $\frac{2}{3}$  mm. longo ore totiusque lato subglabro, limbo 5-partito-lobato, lobis subglabris triangulari-oblongis  $\frac{1}{2}$  mm. longis vel longioribus totiusque latis vel minus latis glabris apice obtusissimis basi haud contractis margine haud ciliatis intus extusque glabris. Ovarium inferius  $\frac{2}{3}$  mm. longum apice disco hirsuto coronatum 3-loculare, stylo 3 mm. longo erecto recto basi plus minus latiore glabro, stigmate subclavato. Fructus breve stipitatus, stipite  $\frac{2}{3}$  mm. longo, ovoidco-ellipsoideus plus minus obliquus 3 mm. latus glaber calycis lobis exceptis  $3\frac{1}{2}$  mm. longus basi circ. 1 mm. latus apice cum calycis tubo et lobis brevissime rostratus, rostris cum calycis lobis  $\frac{3}{4}$  mm. longis, 1-spermus. Semina  $\nu$ -formia, testa membranacea; albumen copiosum carnosum; embryo U-forme recurvatus, cotyledonibus lineari-oblongis radícula æquilatis quam radícula multo brevioribus.

HAB. Loo-choo: Nagotake, leg. G. NAKAHARA, Aprili. 1909 fl.; KANASHIRO (No. 13.); Y. TASHIRO, fr.

Very near *S. lancifolia* S. et Z., but differs from it by the much smaller bracts, smaller calyx-lobes, larger corolla, and shortly stalked fruits. Also near *S. microcarpa* CHAMP. and *S. caudata* WALL., but distinguishable from them by the much smaller leaves and ovary which is very pilose at the apex.

**Symplocos microcarpa** CHAMP.; BENTH. Fl. Hongk. p. 212; BRAND Symplocaceæ, in ENGL. Pfl.-reich p. 42, n. 62. Frutex? ramis et ramulis gracilibus, cortice fusco-purpurascenti glabro lenticellis minutis rotundatis notato longitudinaliter ruguloso. Folia oblonga vel obovato-oblonga apice caudato-acuminata  $6\frac{1}{2}$  cm. longa  $2\frac{1}{2}$  cm. lata apice caudato-acuminata ad summum obtusa vel breve aristata basi obtusa vel acuta margine remote mucronato-serrulata vel subintegra sed basi acumineque integra pagine utraque glabra, costa supra tenuiter sulcata subtus elevata, venis venulis utraque pagine tenuiter elevatis reticulatis tenuissimis subtus pallidioribus, petiolis 4 mm. longis angustissime alatis intus sulcatis extus convexis. Spicæ floris 1 cm. longæ paucifloratæ, floribus a se 1-2 mm. remotis; rhachibus spicæ et pedicellis hirsutis in exsiccato viridibus, pedicellis 1 mm. longis vel brevioribus, bracteis sub flore singulo unicis  $1\frac{2}{3}$  mm. longis 2 mm. latis apice rotundatis basi haud contractis extus brevissime hirsutis subtus glabris; bracteolis sub flore singulo duabus. Calyx viridis glaber

campanulatus  $2\frac{1}{2}$  mm. longus totiusque latus, tubo tubuloso-obconico basi  $\frac{1}{2}$  mm. in diametro apice 1 mm. in diametro viridi glabro, limbo 5-partito, partibus oblongo-rotundatis 1 mm. longis totiusque latis vel latioribus extus sursum brevissime hirsutis intus glabris apice rotundatis vel obtusissimis margine integris paucissime ciliolatis vel haud ciliolatis. Corolla rotata, tubo brevissimo, limbo fere 5-partito, partibus oblongis 4 mm. longis 2 mm. vel 3 mm. latis concavis apice obtusissimis vel rotundatis basi plus minus contractis margine integris. Stamina 16 vel pauciora, filamentis glabris complanato-teretibus. Ovarium 3-loculare apice haud hirsutum, stylo glabro 4 mm. longo apice capitato-stigmatoso.

HAB. Fōkien: Kosan, leg. S. NAGASAWA, 1910, Aprili. (fl.), (Nos. 243, 254, 248).

Near *Symplocos modesta* BRAND and *S. myrtaea* S. et Z., but differs from them by the very short pedicelled flowers.

**Symplocos morrisonicola** HAYATA (Fig. 33) Fl. Mont. Formos. p. 160. Descriptio auctata. Fructus cylindrico-ellipsoideus 8 mm. longus 4 mm. latus plus minus recurvus vel rectus fuscus basi contractus apice plus minus rostrato-elongatus, partibus elongatis 1 mm. longis, 3-locularis 3-spermus vel abortu 1-spermus apice calycis lobis oblongis 2 mm. longis apice rotundatis margine ciliolatis coronatus. Semina linearia  $\pm$  complanata recta, testa tenuissima; albumen copiosum; embryo centralis, radicula superiore, linearis 7 mm. longus  $\frac{1}{3}$  mm. latus  $\pm$  complanatus, cotyledonibus cum radicula æquilatis linearibus  $1\frac{1}{2}$  mm. longis.

HAB. Mt. Arisan: ad 7000 ped. alt., Jan. 1912, leg. B. HAYATA et S. SASAKI.

**Symplocos Nakaii** HAYATA sp. nov. (Fig. 25-e).

Arbor. Rami et ramuli in exsiccatō teretes fusco-rubescētes, cortice longitudinaliter fissō et rugosō. Folia chartacea vel chartaceo-coriacea oblongo-oblanccolata vel oblanceolata  $6\frac{1}{2}$ – $9\frac{1}{2}$  cm. longa 20–28 mm. lata apice caudato-acuminata, acuminibus linearibus obtusis, basi longē cuneata ad petiolum attenuata margine integerrima angustissime cartilagineo-nervata, costa supra sulcata impressa, venis venulis supra vix vel haud elevatis haud impressis

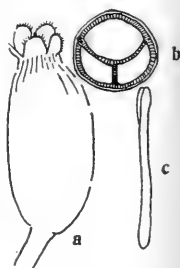


Fig. 33, *Symplocos morrisonicola* HAYATA; a, a fruit; b, cross section of the same; c, an embryo.

subtus distincte tenuiter elevatis, venis primariis utroque latere costæ 5-7, mediis a costa angulo 40° egressis ad supra medium rectis sursum arcuatis cum iis superioribus junctis, venulis reticulatis, pagine supra in exsiccato nitida atroviridescencia glaberrima subtus pallido-viridia glabra, petiolis brevibus 3-5 mm. longis complanatis subalatis intus tenuiter canaliculatis glabris. Flores sessiles ad axillas fasciculati, fasciculis 2-5-floratis; bractea sub flore unica, bracteolis sub flore singulo duabus dispositis; bracteis late rotundatis 2 mm. longis 4 mm. latis margine remote verrucoso-serrulatis extus plus minus hirsutis intus glabris coriaceis, bracteolis ovato-rotundatis 2 mm. longis totiusque latis extus hirsutis vel subglabris intus glabris margine remote verrucoso-serrulatis intus concavis extus convexis carinatis. Flores non visi.

Fructus præmaturus cylindricus 12 mm. longus 3 mm. latus apice basique angustior glaber teres apice calyce persistenti coronatus, calyce campanulato 2-3 mm. longo apice 4-5 mm. lato 5-lobato, lobis oblongo-rotundatis 1½ mm. longis 2 mm. latis apice rotundatis coriaceis.

HAB. Shinsuiyei, leg. S. NAKAI, Dec. 1912 (No. 19).

**Symplocos phæophylla** HAYATA

sp. nov. (Fig. 34). Arborescens? Rami et Ramuli teretes recti, superioribus fusco-rubrescentibus, cortice longitudinaliter fisso ruguloso. Folia obovato-lanceolata oblongo-lanceolata 10 cm. longa 3 cm. lata apice acuto-acuminata ad summum obtusa basi cuneata vel cuneato-obtusa integerrima margine plana tenuiter coriacea in exsiccato fusco-rubrescentia vel fusca, costa supra impressa subtus elevata, venis lateralibus primariis tenuissimis supra

haud visis vel obscure visis impressis subtus tenuiter elevatis utroque latere 7-8

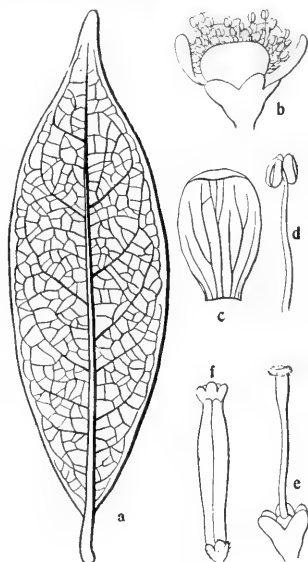


Fig. 34, *Symplocos phæophylla* HAYATA; a, a leaf; b, a flower; c, a corolla-lobe; d, a stamen; e, calyx and style; f, a fruit.

angulo  $45^{\circ}$  a costa divaricatis, venulis subtus tenuissime elevatis tenuissime elevato-reticulatis, petiolis 3 mm. longis  $1\frac{1}{2}$  mm. latis planis vel leviter sulcatis dorso rotundatis fusco-rubrescentibus. Spicæ brevissimæ axillares vel flores ad axillas glomerati, floribus totis sessilibus, bracteis sub flore 3-4 dispositis rhomboideo-rotundatis  $2\frac{1}{2}$  mm. longis totiusque latis extus hirsutis, pilis ferrugineis, intus glabris. Calyx glaber latissime campanulatus cum lobis 5 mm. in diametro tubo brevissimo, limbo 5-lobato, lobis glabris in exsiccato rubro-fuscentibus oblongis rotundatis 2 mm. longis totiusque latis apice rotundatis basi haud contractis latioribus vel leviter contractis margine integerrimis haud ciliolatis plus minus concavis. Corolla late campanulata alte 5-lobata vel partita, lobis vel partibus oblongis vel obovato-oblongis 5-6 mm. longis  $4-4\frac{1}{2}$  mm. latis apice rotundatis basi  $\pm$  cuneatis basi 1 mm. latis margine integris vel obscure erosis valde concavis glaberrimis in exsiccato-fusco-flavescentibus. Stamina  $\infty$  obscure vel distincte pentadelpia. Ovarium 3-loculare inferius brevissimum apice discis annuli-formibus planis coronatum apice planum glabrum, stylo  $4-4\frac{1}{2}$  mm. longo columniformi erecto recto apice  $\pm$  latiore, stigmate terminali truncato haud lobato. Fructus sessilis cylindricus subrectus vel  $\pm$  arcuatus cum reliquis calycis lobi  $1\frac{1}{2}$  cm. longus 3 mm. in diametro sectionis subscaber vel glaber apice calycis lobis coronatus, lobis calycis oblongis  $1\frac{1}{2}$  mm. longis apice rotundatis.

HAB: Loco non indicato, leg. R. KANEHIRA.

Near *S. congesta* BENTH. (Fl. Hongk. p. 211; BRAND, Symplocaceæ, in ENGL. Pfl.-reich p. 69), in the coriaceous leaves which are elliptical, acuminate at the apex, cuneate at the base, and in the densely fascicled flowers with long calyx-lobes and short calyx-tubes, but widely different from it by the entire leaves and cylindrical fruits.

**Symplocos risekiensis** HAYATA. sp. nov. (Fig. 35). Arborecens? rami fusco-cinerascentes, ramulis glabris rectis. Folia ovato-oblonga vel obovato-lanceolata 18 cm. longa  $2\frac{1}{2}$  cm. lata apice cuspidato-acuminata vel breve acuminata ad summum obtusa basi acuta vel cuneato-acuta margine basibus acuminibusque integris exceptis minute obscureque serrulata, serrulis haud mucronatis, vel subintegra chartacea vel chartaceo-coriacea in exsiccato fulvescentia subconcolora utraque pagine glabra, costa supra tenuiter impressa subtus elevata, venis supra haud elevatis haud impressis subtus tenuissime elevatis gracillimis, venulis supra



haud visis haud elevatis subtus tenuissime elevatis vix visis, venis lateralibus primariis utroque latere costæ 12-13, mediis a costa angulo 40° egressis, costa supra fusco-colorata, petiolis glabris 12mm. longis intus concavis vel sulcatis extus convexis. Spicæ in axillis foliorum superiorum densiuscule dispositorum sitæ vel terminales, rhachibus spicarum molle dense cinereo-pubescentibus, floribus dense dispositis, superioribus subsessilibus, inferioribus brevissime pedicellatis, pedicellis 1-2 mm. longis, bracteis sub flore singulo unicis basi pedicellorum sitis late semiorbicularibus  $2\frac{1}{2}$  mm. longis 3 mm. latis apice obtusissimis basi haud contractis vel minus latis extus margineque pubescentibus intus glabris deciduis, bracteolis sub flore singulo duabus sub calycis tubo sitis ovato-oblongis  $1\frac{1}{3}$  mm. longis 1 mm. latis intus glabris extus margineque dense pubescentibus. Calyx obconico-campanulatus  $1\frac{1}{2}$  mm. longus  $2\frac{1}{2}$  mm. latus, tubo glabro minus quam 1 mm. longo obconico-tubiformi, limbo 5-partito, partibus rotundatis 1 mm. in diametro dorso paucissime hirsutis margine dense ciliolatis apice rotundatis intus glabris. Corolla rotata, tubo brevissimo  $\frac{1}{3}$  mm. longo, lobis oblongis  $3\frac{1}{2}$  mm. longis  $2\frac{1}{3}$  mm. latis apice rotundatis basi haud contractis concavis margine integris haud ciliolatis. Stamina obscure pentadelphæ, filamentis glabris. Ovarium apice non hirsutum, disco glabro, stylo  $3\frac{1}{2}$  mm. longo glabro apice capitato.

HAB. Nantō: Risikisan, leg. T. KAWAKAMI et U. MORI, Mart. 1908, (No. 3551).

*Symplocos prunifolia* HAYATA Mater. Fl. Formos. p. 188, (non. SIEB. et Zucc.).

Differs from *S. prunifolia* S. et Z. by the narrower leaves, nearly sessile flowers and especially by the spikes which are nearly so limited to the uppermost parts of the branches that they always crown the top of the latter.

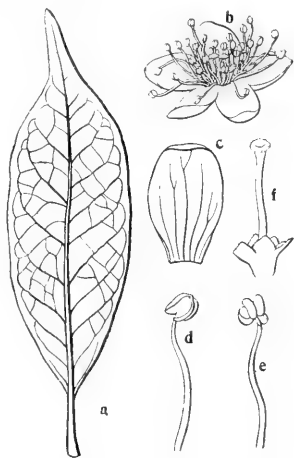


Fig. 33, *Symplocos risikiensis* HAYATA; a, a leaf; b, a flower; c, a corolla-lobe; d, e, stamens, seen from different sides; f, calyx and style.

**Symplocos Sasakii** HAYATA sp. nov. (Fig. 36). Frutex? ramis gracilibus, fuscentibus, ramulis haud rectis plus minus flexuosis fulvo-flavescentibus glabris remote foliosis subteretibus vel subangularibus. Folia oblonga vel obovato-vel ovato-oblonga 5 cm. longa  $2\frac{1}{2}$  cm. lata apice subito acuminata vel caudata, caudis 1 cm. longis 3 mm. latis, ad summum mucronata vel ad summum obtusa basi acuta vel cuneata acuta margine basibus caudis exceptis crenulato-serratis, serris brevibus, pagine utraque glabra, costa supra impressa subtus elevata, venis lateralibus gracillimis utroque latere costae 5-7 angulo  $45^\circ$  a costa egres- sis supra haud elevatis subtus tenuiter elevatis, petiolis 7 mm. longis intus pro- funde sulcatis subtus convexis glabris. Racemi breves 1 cm. longi paucè hirsuti pauciflorati, pedicellis 1 mm. longis subglabris, bracteis flore singulo unicis subrotundatis 2 mm. longis totiusque latis intus glabris margine ciliolatis extus subglabris basi pe- dicelli sitis, bracteolis sub flore sin- gulo duabus basi calycis tubi sitis quam bractea minoribus late rotun- datis  $\frac{2}{3}$  mm. longis latioribus quam longis intus glabris extus subglabris margine ciliolatis. Calyx glaber tubuloso-obconicus 2 mm. longus basi 1 mm. latus apice 2 mm. latus, limbo late campanulato 5-lobato glabro, lobis late rotundato-triangularibus 1 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusissimis intus glabris subtus subglabris margine breve ciliolatis. Corolla alte 5-lobata, lobis  $4\frac{1}{2}$  mm. longis  $2\frac{1}{2}$  mm. latis obovato-oblongis apice obtusissimis basi vix vel haud contractis margine integris ciliolatis. Stamina  $\infty$  indistincte penta- delpha, filamentis glabris. Ovarium locale apice disco annuliformi  $\frac{1}{3}$  mm. alto coronatum, stylo 5 mm. longo glabro apice capitato. Fructus ovoidens 13 mm. longus 10 mm. latus apice rostrato-angustatus basi ad insertionem  $1\frac{1}{2}$  mm. in diametro apice ad orem 3 mm. in diametro.

HAB. Hieranzan, leg. S. SASAKI, Mai. fr. et fl.

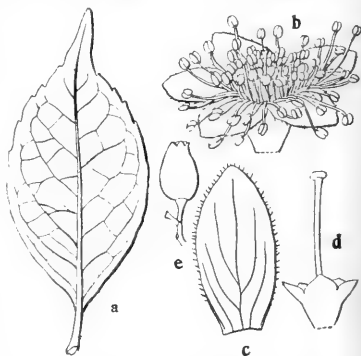


Fig. 36, *Symplocos Sasakii* HAYATA; a, a leaf; b, a flower; c, a corolla-lobe; d, a flower, corolla and stamens taken off; e, a fruit.

Near *S. urceolaris* HANCE, (BRAND Symplocaceæ, ENGL. Pfl.-reich p. 66, n. 170), but differs from it by the much larger fruits.

**Symplocos spicata** ROXB. BRAND Symplocaceæ in ENGL. Pfl.-reich p. 39.

HAB. Ōshima, leg. S. KAWAGOE, (No. 100) Aug., 1910. fl.

**Symplocos spicata** ROXB. var. **acuminata** BRAND (Fig. 37) Symplocaceæ in ENGL. Pfl.-reich p. 40.

*Symplocos spicata* HAYATA Mater. Fl. Formos. p. 160, (non ROXB.).

HAB. Shinkō, leg. U. MORI, (No. 1330) Juni, 1906; Kwarenkō: Tabirakei, (fl.); Fōkien, Kosan, leg. S. Nagasawa, Feb. 1909, (No. 99, fr.).

**Symplocos stenostachys** HAYATA sp. nov. (Fig. 38). Frutex? ramuli recti subgraciles glabri fuscentes remote foliati. Folia lanceolata vel oblongo-lanceolata vel lanceolata 10 cm. longa  $2\frac{1}{2}$  cm. lata apice acuminata, acuminibus plus minus recurvis integris, basi cuneato-acuta chartacea in exsiccato virido-flavescentia margine minute serrulata, serrulis a se 4 mm. remotis brevissimis apice fusco-punctatis, prope basin integra utraque pagine glabra, costa

supra tenuissime impressa subtus distincte elevata, venis supra haud elevatis haud impressis planis subtus tenuissime elevatis gracillimis, venulis supra haud elevatis obscuris vix vel haud visis subtus tenuissime elevatis vix vel haud visis tenuissimis, utraque pagine haud nitida subtus pallidissima subconcolora, venis

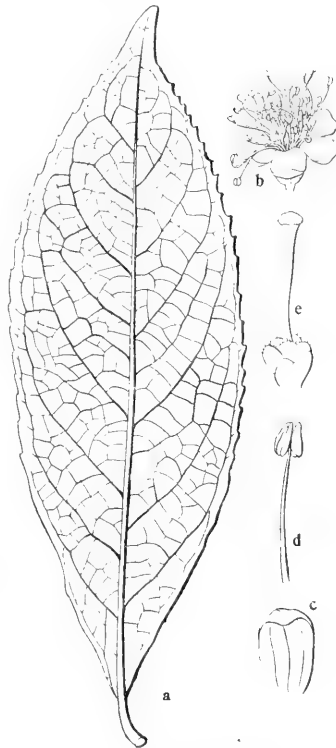


Fig. 37, *Symplocos spicata* ROXB. var. *acuminata* BRAND; a, a leaf; b, a flower; c, a corolla-lobe; d, a stamen; e, calyx and style; a=natural size.

utroque latere costæ primariis lateralibus 9-10 a costa angulo  $45^\circ$  egressis, utraque pagine glabra, petiolis 1 cm. longis glabris intus sulcatis extus convexis subalatis vel haud alatis. Pedunculæ axillares basi ramosæ, ramis 4-5 longissimis spiciformibus 5-6 cm. longis gracillimis flavescentibus 1 mm. in diametro rectis ascendentibus dense vel paucè ferrugineo-hirsutis basi remote sursum dense floriferis, floribus sessilibus; bracteæ sub flore singulo unicæ rotundato-rhomboidæ 1 mm. longæ totiusque latæ intus glabræ margine ciliolatæ extus dense ferrugineo-hirsutæ; bracteolis sub flore singulo duabus cum bractea conformibus. Calyx subglaber late semi-globoso-campanulatus, tubo 1 mm. lato brevissimo  $\frac{1}{2}$  mm. longo, limbo 5-lobato, lobis semi-rotundatis valde concavis  $\frac{2}{3}$  mm. latis  $\frac{1}{2}$  mm. longis intus glabris extus hirsutis margine ciliatis apice rotundatis. Corolla rotata, tubo  $\frac{1}{3}$  mm. longo, limbo patenti 5-partito, partibus patentissimis concavis oblongis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis apice inflexis concavissimis apice rotundatis margine integerrimis. Stamina  $\infty$  indistincte pentadelphæ, filamentis glabris. Ovarium 3-loculare, stylo recurvato 3 mm. longo apice capitato basi plus minus dilatato.

HAB. Shinchiku: Goshōrin, leg. T. KAWAKAMI, Aug. 1906, (No. 1438).

Near *Symplocos spicata* ROXB., but distinguishable from it by the smaller acuminate leaves and very much more slender spikes with very much smaller flowers.

***Symplocos suishariensis* HAYATA sp. nov.** (Fig. 39). Arbriuscula, rami graciles teretes fuscentes vel cinerascens, cortice glabro longitudinaliter tenuissime ruguloso, ramulis teretibus fulvo-pubescentibus gracilibus. Folia chartacea vel membranaceo-chartacea ovata vel ovato-oblonga vel oblonga 6 cm. longa  $2\frac{1}{2}$  cm. lata apice caulato-acuminata ad summum obtusa ad centrum summorum aristato-apiculata, aristis 1 mm. longis basi rotundatis obtusissimis, vel obtusa obliqua vel æqualia margine basibus acuminibusque integris exceptis obscure serru-

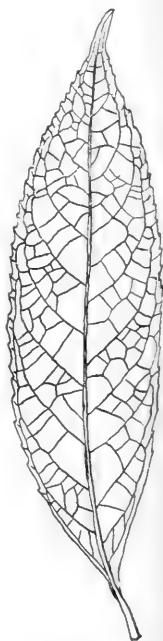


Fig. 38, *Symplocos stenostachys* HAYATA.

*lata*, serrulis haud mucronatis a se 4 mm. remotis brevissimis, costis venis supra vix elevatis vel haud elevatis, costa subtus elevata, venis subtus vix vel haud elevatis tenuissimis, supra glabra vel subglabra subtus ad costam sparse ferrugineo-pubescentia, venis lateralibus primariis utraque pagine 8–10 gracillimis vix visis, mediis a costa angulo 50°–60° egressis rectis, pagine subtus pallidiora, petiolis 3–4 mm. longis adpresse hirsutis  $\frac{2}{3}$  mm. latis intus leviter concavis extus convexis. Spicæ interdum racemiformes ad axillas foliorum superiorum sitæ 3 cm. longæ, rhachibus dense pubescentibus ferrugineis; floribus a se 1 mm. distantibus breve pedicellatis, pedicellis 2 mm. longis, bracteis sub flore singulo unicis basi pedicelli sitis triangulari-rotundatis  $1\frac{1}{3}$  mm. longis totiusque latis apice obtusis basi plus minus contractis margine ciliolatis extus dense hirsutis intus glabris, bracteolis sub flore singulo duabus basi calycis tubi sitis triangulari-oblongis  $1\frac{1}{4}$  mm. longis 1 mm. latis apice acutis extus dense hirsutis intus glabris minute ciliolatis. Calyx campanulatus  $1\frac{2}{3}$  mm. longus  $1\frac{1}{2}$  mm. latus, tubo obconico  $\frac{3}{4}$  mm. longo apice 1 mm. lato glabro, limbo campanulato 5-partito, partibus rotundato-oblongis concavis intus glabris margine integris haud ciliolatis  $\frac{3}{4}$  mm. longis  $\frac{2}{3}$  mm. latis apice rotundatis basi leviter contractis extus plus minus hirsutis vel subglabris. Corolla rotata alte 5-partita, partibus obovato-oblongis 3 mm. longis 2 mm. latis margine minute sub lente crosis patentissimis concavis apice rotundatis basi haud contractis. Stamina obscure pentadelphæ fere libera vel plus minus connata, filamentis glabris. Ovarium 3-loculare apice disco hirsuto  $\frac{1}{4}$  mm. alto coronatum, stylo  $3\frac{1}{2}$  mm. longo glabro apice plus minus dilatato ad summum capitato basi plus minus dilatato. Fructus sessilis ovoideus 5 mm. longus  $3\frac{1}{2}$  mm. latus glaber apice acutus apiculatus.

HAB. Arisan, inter Suisharyō et Funkiko, ad 4000 ped. alt., leg. R. KANEHIRA, I. TANAKA et B. HAYATA, Aprili. 1914.

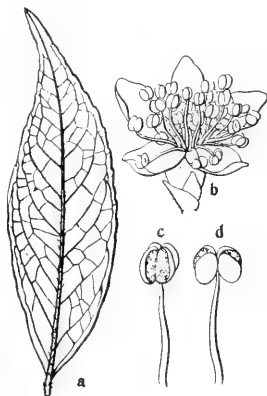


Fig. 39, *Symplocos suishariensis* HAYATA; a, a leaf; b, a flower; c, d, stamens, seen from different sides.

Near *S. arisanensis* HAYATA, but easily distinguishable from it by the much smaller flowers and by the more minutely serrulate ovate leaves with an ovate base. *S. arisanensis* HAYATA has much larger flowers and remotely serrate oblong leaves with a cuneate base.

**Symplocos trichoclada** HAYATA. sp. nov. (25-f). Frutex ramosissimus, ramis teretibus fusco-nigricantibus longitudinaliter rugulosis, ramulis gracilibus ferrugineo-tomentosis, pilis patentibus, teretibus ramosis remote foliosis 1 mm. in diametro sectionis. Folia alterna  $1\frac{1}{2}$  cm. remota tenuiter coriacea ovato-lanceolata vel ovato-oblonga 3-5 cm. longa  $1\frac{1}{2}$  cm. lata apice acuta vel acuminata ad summum obtusa ad centrum summorum aristato-mucronata basi acuta vel obtusa margine tenuiter serrulata, serrulis interdum ad puncta reductis, punctis a se  $1-1\frac{1}{2}$  mm. remotis, basi et acumine integra, costa supra tenuiter impressa subtus elevata, venis lateralibus primariis utroque latere costæ 9-10 a costa  $40^{\circ}-45^{\circ}$  a costa egressis tenuissimis supra non visis subtus tenuissime elevatis, pagina supra tenuiter hirsuta subtus molle villosa ad costam pilis fuscentibus densis patentibus dispersa, pilis ad paginam adpressis, petiolis  $2\frac{1}{2}$  mm. longis dense ferrugineo-hirsutis. Spicæ floris breves axillares paucifloratæ ferrugineo-hirsutæ, pedicellis brevissimis 1 mm. longis hirsutis; bracteæ sub flore singulo unicæ brevissimæ late rotundatæ extus hirsutæ apice rotundatæ ciliolatæ 1 mm. latæ  $\frac{1}{2}$  mm. longæ; bracteis sub flore singulo duabus ovato-rotundatis 1 mm. longis totiusque latis ad longitudinem subplicatis intus glabris extus hirsutis. Calyx obconico-campanulatus 2 mm. longus  $2\frac{1}{2}$  mm. latus, tubo glabro obconico 1 mm. longo, limbo basi  $\pm$  hirsuto alte 5-lobato vel 5-partito, partibus vel lobis oblongo-rotundatis 1 mm. longis plus quam 1 mm. latis margine integris haud ciliolatis extus basi tenuissime hirsutis intus glabris. Corolla in exsiccato flavescent campanulata alte 5-lobata vel fere 5-partita, lobis oblongis concavis  $3\frac{1}{2}-4$  mm. longis 2 mm. latis apice obtusis basi contractis margine integris utraque glabris. Stamina indistincte pentadelphæ, filamentis glabris. Ovarium 3-loculare apice hirsutum, stylo 4 mm. longo basi plus minus dilatato apice stigmatoso glabro.

HAB. In montibus centralibus, ad 5000 ped. alt., leg. S. SASAKI, Jan. 1907, (No. 1).

Near *Symplocos Fordii* HANCE, (BRAND Symplocaceæ in ENGL. Pfl.-reich p. 66), but differs from it by the leaves which are not cordate like *S. Fordii*;

also near *Symplocos morrisonicola* HAYATA, but widely different from it by the densely hirsute branches and hairy leaves.

***Symplocos wikstrœmiifolia*** HAYATA. sp. nov. (25-l). Ramuli recti fusco-cinerascentes vel fusco-purpurascetes, cortice longitudinaliter rugoso et transverse fisso, ramulis superioribus summum angularibus ad angulos angustissime alatis. Folia tenuiter coriacea oblanceolata 8 cm. longa 24 mm. lata apice breve acuminata vel subito acuta ad summum obtusa ad centrum summorum minute mucronata basi cuneato-attenuata ad petiolum abeuntia margine subintegra vel obscure minuteque erosa margine plus minus desuper recurva vel subplana, costa supra tenuiter impressa subtus prominente elevata, venis supra vix impressis subtus tenuissime elevatis tenuissimis gracillimis, venulis utraque pagine vix vel haud visis, pagine utraque glabra supra fusco-viridia subtus pallidiora, petiolis in exsiccato fusco-rubescens glabris 7 mm. longis intus planis extus convexis. Flores apertientes haud visi. Spicæ alabastrorum florum axillares vel interdum ad latus rami defoliati sitæ breves dense florifere; bractæ sub flore singulo unicæ oblongæ vel rotundatæ  $1\frac{1}{2}$  mm. longæ totiusque latæ margine ciliolatæ dorso leviter brevissime hirsutæ crassiusculæ, bracteolis sub flore singulo duabus quam bractea angustioribus. Calyx obconicus 5-lobatus, lobis rotundatis 1 mm. in diametro intus glabris dorso subglabris margine ciliolatis. Stamina 15 subdistincta, filamentis glabris. Cætera ignota.

HAB. Randaizan, leg. U. MORI, Mart. 1908, (No. 3719).

Very near *S. neriifolia* S. et Z., but differs from it by the smaller oblanceolate leaves and longer flower-clusters.

***Symplocos*** sp. Frutex? Rami teretes fusco-cinerascentes longitudinaliter rugulosi, ramulis angulatis ad angulos subalatis in exsiccato flavescentibus ultimis rectis remote foliatis glabris. Folia coriacea rhomboideo-oblonga  $4\frac{1}{2}$  cm. longa 2 cm. lata apice acuta ad summum obtusissima vel obtusa basi cuneata ad petiolum abeuntia margine basi integra medio sursum remote serrulata, costa in exsiccato supra plus distincte subtus minus distincte elevata, venis venulisque utraque pagine elevatis reticulatis, venis primariis lateralibus utroque latere costæ 7-6 angulo  $45^\circ$  a costa divaricatis, pagine utraque glabra in exsiccato subconcolora virido-flavescentia, petiolis 5 mm. longis intus planis vel sulcatis extus (dorso) convexis glabris.

HAB. Shintiku: Tonnofushirowan, leg. I. TANAKA, Oct. 1913, fl.

*Alniphyllum* MATSUM.

***Alniphyllum hainanense*** HAYATA sp. nov. (Fig. 40-a). Arbor? rami et ramuli fusco-cinerascentes teretes sursum dense stellato-pubescentes, pilis stellatis brevissimis, inferioribus albescentibus superioribus fulvescentibus, remote foliati ad axillas foliorum gemmam gerentes. Folia membranacea vel tenuiter chartacea in exsiccatu supra fusco-nigricantia subtus albicantia vel albo-fulvescentia oblongo-elliptica obovato-oblonga vel ovato-oblonga 15-8 cm. longa 6-3 cm. lata apice acuta vel breve acuminata basi acuto-cuneata acuta vel obtusa margine prope basin integra sed supra basin usque ad summum acuminis minute remoteque serrulata, serrulis ad mucronem reductis, mucronibus a se 3-7 mm. remotis, pagine supra parcissime stellato-hirsuta subtus dense stellato-villosa, pilis brevissimis, costa supra dense stellato-hirsuta haud impressa vix vel haud elevata subtus tenuiter elevata, venis supra haud elevatis vix impressis subtus tenuissime elevatis, venis primariis lateralibus utroque latere costæ 9-10 a costa angulo 45° egressis subrectis haud flexuosis, venulis utraque pagine vix visis, petiolis 15 mm. longis complanato-teretibus intus planis vix sulcatis extus (dorso) convexis dense adpresse stellato-hirsutis. Paniculæ ad ramulos terminales 10-15 cm. longæ; rhachibus paniculæ et pedicellis dense stellato-pilosis; bracteis subulato-linearibus 3 mm. longis  $\frac{1}{4}$  mm. latis dense stellato-pilosis. Calyx late campanulatus alte 5-lobatus, lobis longis triangularibus  $2\frac{1}{2}$  mm. longis basi latissimis 2 mm. latis apice acuminatis margine integris extus dense stellato-pilosis intus sericeo-pilosis, pilis (exceptis marginibus) simplicibus longiusculis, versus marginem stellato-hirsutis, sinibus inter lobos triangularibus acutis. Corolla alte 5-lobata, tubo brevissimo utraque facie glabro 1 mm. longo, lobis 5 oblongis 12 mm. longis 8 mm. latis utraque pagine dense stellato-pilosis apice obtusissimis basi plus minus contractis margine integris. Stamina 10, filamentis ad tubum longum connatis extus perfecte glabris intus densissime stellato-pilosis compla-

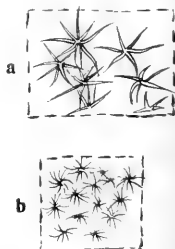


Fig. 40, Stellate hairs on a leaf of *Alniphyllum hainanense* HAYATA; b, stellate hairs on a leaf of *Alniphyllum pterospermum* MATSUM.



natis sursum liberis, partibus liberis 1 mm. longis  $\frac{2}{3}$  mm. latis, tubo filamentorum basi tubo corollæ connato, antheris linearibus 3 mm. longis  $\frac{2}{3}$  mm. latis utrinque emarginatis glabris. Ovarium depresso-globosum superius 3 mm. longum totiusque latum dense stellato-pilosum, stylo 10 mm. longo columnari deorsum piloso sursum glabro striato apice capitato-stigmatifero.

HAB. Hainan, leg. Z. KATSUMADA, 1906.

Near *Alniphyllum pterospermum* MATSUM., but easily distinguishable from it by the very much thinner membranaceous leaves with very much larger stellate hairs and by the tubes of the filaments which are glabrous on the outer side but densely hirsute on the inner side.

***Alniphyllum pterospermum***

MATSUM. (Fig. 40-b); MATSUM. et HAYATA Enum. Pl. Formos. p. 232.

*Styrax* LINN.

***Styrax Henryi*** PERK. *Styracaceæ* in ENGL. Pfl.-reich p. 33.

HAB. Bankinsing (ex PERKINS).

var. ***microcalyx*** PERK. l.c. p. 33.

HAB. South cape, (ex PERKINS).

***Styrax formosanum*** MATSUM. (Fig. 41) in MATSUM. et HAYATA Enum. Pl. Formos. p. 235.

HAB. Arisan: inter Funkiko et Taroyen, (fl.) Jan. 1912, leg. B. HAYATA et S. SASAKI; inter Karapin et Funkiko, leg. T. Itō, Mart. 1914. (fl.)

***Styrax Hayataianum*** PERK. in Fedde Repert. VIII. (1910) p. 83.

HAB. Kōshūn, Kankao, leg. T. KAWAKAMI, 1906, Oct. (No. 1657).

***Styrax kotsensis*** HAYATA sp. nov. Arborescens? Rami glabri fusco-purpurascens, cortice sublevi; ramulis glabris, cortice fulvescentibus, flexuosis. Folia

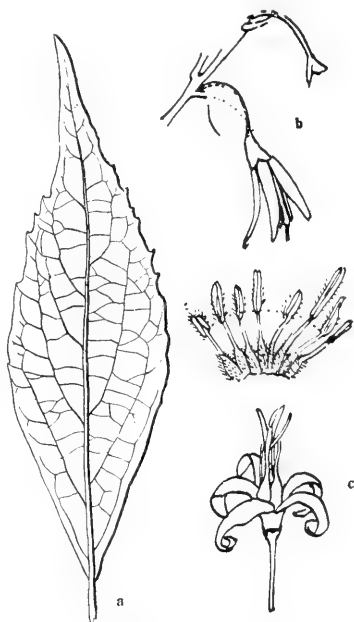


Fig. 41, *Styrax formosana* MATSUM.; a, a leaf; b, inflorescence; c, a flower; d, stamens, expanded.

ovata vel ovato-oblonga 10–12 cm. longa  $5\frac{1}{2}$ –7 cm. lata apice subito acuta vel breve cuspidato-acuta basi subito acuta margine subintegra vel remote mucronibus instructa, mucronibus a se 5–10 mm. remotis, chartacea, costa supra haud vel vix elevata subtus elevata, venis venulis supra tenuissime elevatis subtus prominente elevatis, venis lateralibus primariis utroque latere costæ 3–4, superioribus a costa angulo  $45^\circ$ , mediis a costa angulo  $40^\circ$ , inferioribus a costa angulo  $30^\circ$  egressis, subtus pallida utraque pagine subglabra vel glabra, petiolis 15 mm. longis subglabris vel plus minus pubescentibus intus concavis extus convexis. Flores non visi. Pedicelli fructiferi 16 mm. longi glabri sursum accrescentes ad basin

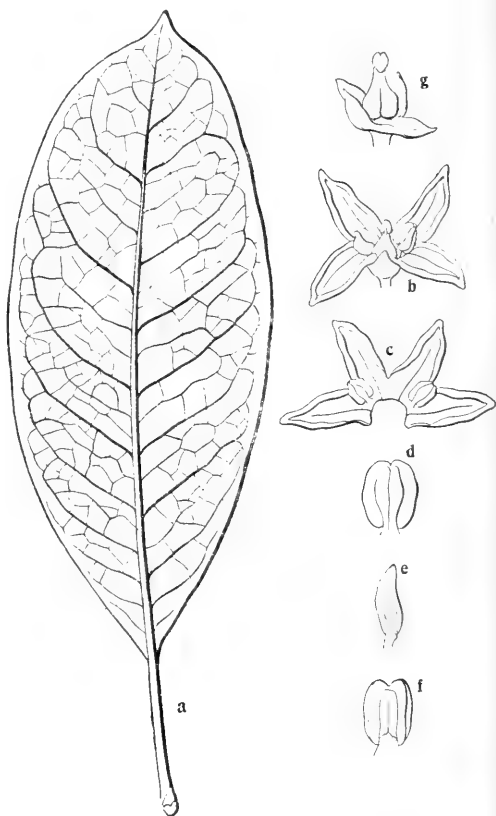


Fig. 42, *Linociera Cumingiana* VIDAL; a, a leaf; b, a flower; c, corolla; d, e, f, stamens, seen from different sides; g, ovary; a, natural size; others magnified.

calycis  $3\frac{1}{2}$  mm. in diametro multisulcati. Calyx fructifer late campanulatus 8 mm. latus 5 mm. longus, lobis semi-rotundatis vel triangularibus 2 mm. longis

3 mm. latis. Fructus ovoideus 1 cm. longus vel longior plus minus oblique vel haud oblique apice rostrato-acutus ad summum reliquis styli apiculatus basi rotundatus, exocarpio albicanti, 1-spermus. Semina fusco-fulvescentia ellipsoidea apice acuta vel obtusa basi rotundata vel truncata a summo usque ad basin distincte lateque 4-sulcata, testa crustacea; albumen copiosum.

HAB. Kōtōshō, leg. Y. TASHIRO, T. KAWAKAMI et S. SASAKI, Juli., 1912 (fr.).

Very near *Styrax japonicum* S. et Z., but differs from it by the very much larger subentire leaves and shorter pedicels. Closely resembles a Loo-choo plant which is labelled as *Styrax japonicum* in the herbarium at Tōkyō.

### Oleaceæ.

#### *Linociera* Sw.

***Linociera Cumingiana*** VIDAL (Fig. 42), Rev. Pl. Vasc. Filip. (1886) p. 181; MERRILL in Philipp. Journ. Sci. Suppl. I. (1906) p. 115.

HAB. Kōtōshō, leg. S. SASAKI, Juli., 1911, (No. 6).

#### *Ligustrum* LINN.

***Ligustrum Pricei*** HAYATA sp. nov. (Fig. 43). Frutex. Rami et ramuli annotini teretes recti, cortice cinerascenti glabro plus minus ruguloso, gracillimi, ramulis hornotinis rectis cinereo-rubescensibus hirsutis apice foliatis. Folia opposita rhomboideo-oblonga  $4\frac{1}{2}$ –6 cm. longa 18–30 mm. lata apice triangulari-acuta ad summum crassiusculo-apiculata margine integerrima margine tenuissime deorsum recurva basi acuta vel cuneata utraque pagine glaberrima coriacea, costa impressa subtus elevata, venis venulisque supra tenuissime elevatis, subtus solum venis primariis tenuissime elevatis, venulis haud elevatis haud visis, subtus pallidissima, venis primariis lateralibus utroque costæ 6–7 rectis, mediis a costa angulo

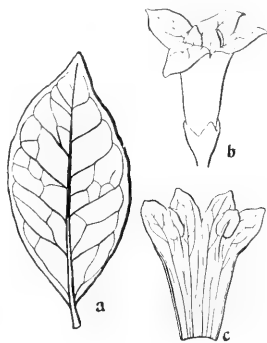


Fig. 43, *Ligustrum Pricei* HAYATA; a, a leaf; b, a flower; c, corolla, expanded; a, natural size; b and c, magnified.

60° egressis erectis prope marginem subito angulato-arcuatis cum iis superioribus junctis, petiolis 3-4 mm. longis intus supra sulcatis subalatis transverse rugosissimis. Paniculæ ad apicem ramulorum terminales cum pedunculis 5-6 cm. longæ 2-3 cm. latæ minute hirsutæ, pedunculis 3 cm. longis basi perulis multis suffultis, perulis cuspidato-triangularibus castaneis coriaceis 1-2 mm. longis; bracteis oblongo-lanceolatis 1-2 mm. longis caducis castaneis hirsutis acuminatis, pulvinis bractearum elevatis cupuliformibus, pedicellis ultimis 1-2 mm. longis hirsutis. Calyx obconico-campanulatus  $2\frac{1}{2}$  mm. longus apice 2 mm. latus apice 4-dentatus, dentibus triangularibus 1 mm. latis apice acutus, sinibus inter lobos acutis, vel obscure irregulariter dentatus glaber. Corolla cylindrico-campanulata 7-8 mm. longa apice  $2\frac{1}{2}$  mm. lata, tubo 5 mm. longo, limbo 4-fido, lobis subpatentibus oblongo-triangularibus  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis apice acutis vel breve cuspidato-acutis dorso apice breve apiculatis valvatis glabris. Stamina 2 paullo deorsum sub sinibus inter lobos sita, filamentis glabris circ. 1 mm. longis teretibus, antheris oblongo-linearibus 2 mm. longis  $\frac{2}{3}$  mm. latis apice obtusis basi leviter emarginatis, dorso medio filamento affixis. Ovarium depresso-globosum glabrum, stylo incluso 3 mm. longo recto erecto glabro, stigmatibus terminalibus 2 lobatis, lobis circ. 1 mm. longis intus stigmatosis ovatis apice acutis. Fructus ignotus.

HAB. Horisha, ad 3000 ped. alt., leg. W. PRICE, 1912.

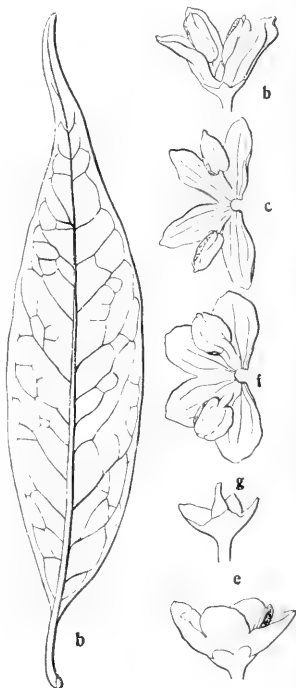


FIG. 44; a-c, *Osmarthus integrifolia* HAYATA; a, a leaf; b, a flower; c, corolla expanded; d-g, *Osmanthus lanceolatus* HAYATA; d, a leaf; e, a flower; f, corolla, expanded; g, a flower, corolla taken off, rudimental ovary seen; a, natural size; others magnified.

Remarkable for the very glabrous small leaves and distinctly lobed calyx, by which it is separable from all other allied species, *L. Ibota* SIEB., *L. ciliatum* SIEB., *L. medium* FR. et SAV., *L. Henryi* HEMSL. and others.

***Osmanthus* LOUR.**

***Osmanthus integrifolius* HAYATA** (Fig. 44, a-c) Mater. Fl. Formos. p. 192.

HAB. Mt. Arisan.

***Osmanthus lanceolatus* HAYATA** (Fig. 44, d-g) Mater. Fl. Formos. p. 192.

HAB. Mt. Arisan, leg. W. PRICE.

Convolvulaceæ.

***Cuscuta* LINN.**

***Cuscuta Kawakamii* HAYATA** sp. nov. Parasitica; caulis tenuiter crassiusculus teres circ. 1 mm. in diametro efoliatus glaber, squamis sub fasciculo florum sitis, triangularibus 2 mm. longis concavis divaricatis. Flores fasciculati, fasciculis sessilibus vel breve pedunculatis glabris, pedicellis ultimis 2-3 mm. longis. Sepala 5, exteriora 3 majora, interiora 2 minora, basi coalita concava suberecta glabra, majora 2 mm. longa totiusque lata apice rotundata margine integra, minora rotundata  $1\frac{2}{3}$  mm. longa  $1\frac{1}{3}$  mm. lata apice obtusa. Corolla extus glabra semiclausa late globosa  $3\frac{1}{2}$  mm. longa usque ad medium 5-lobata, lobis semi-rotundatis  $1\frac{1}{2}$  mm. longis totiusque latis margine erosis intus concavis extus convexis. Stamina 5 cum lobis corollæ alterna, filamentis basi cum tubo connatis sursum liberis, partibus tubo connatis  $\frac{1}{2}$ - $\frac{2}{3}$  mm. longis glabris basi utroque latere squama digitatim fissa instructis, antheris triangularibus rotundatis  $\frac{1}{3}$  mm. longis totiusque latis introrse dehiscentibus. Ovarium late globosum 1 mm. longum  $1\frac{1}{3}$  mm. latum glabrum valde depressum obscure lobatum vel hand lobatum 2-loculare, loculis 2-ovulatis, ovulis anatropis erectis.

HAB. Ritōzan, leg. T. KAWAKAMI, 1913.

Near *Cuscuta chinensis* LAM., but differs from it by the much broader sepals and corolla-lobes, and in the much shorter corolla-tubes. Here is a plant called *Cuscuta Grasii* DELPONTE in Hongkong, with which species our plant should be compared. The original description of *C. Grasii* is not accessible to me.

## Scrophulariaceæ.

*Micrargeria* BENTH.

***Micrargeria formosana*** HAYATA n. n. (Fig. 45). *Sopubia formosana* HAYATA Fl. Mont. Formos. p. 175.

In revising the plant and dissecting the flowers, I have found that this species does not belong to *Sopubia*, but should be referred to *Micrargeria*; for the anthers do not accord with those of the former genus which is stated to be "2 v. omnes per paria coherentes, loculo altero cujusque antheræ perfecte ovato submutico, altero parvo stipitato casso," while they agree pretty well with those of the latter genus which is stated to have "antheræ liberæ, per paria approximatæ, loculis distinctis parallelis v. leviter arcuatis subæqualibus apice affixis basi muticis."—BENTHAM et HOOKER Genera Plantarum II. p. 971.

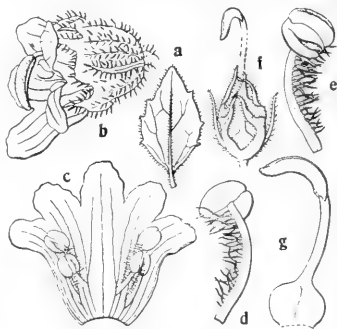


Fig. 45, *Micrargeria formosana* HAYATA; a, a leaf; b, a flower; c, corolla, expanded; d, e, stamens; f, a flower, corolla and stamens taken off; g, ovary and style; a, natural size; others more or less magnified.

*Pedicularis* LINN.

***Pedicularis transmorrisonensis*** HAYATA sp. nov. (Fig. 46). Herba circ. 20 cm. alta basi plus minus lignescens. Caulis molle pubescens tetragonus toto longitudine foliatus erectus eramosus basi 2 mm. in diametro, internodiis 3 cm. longis. Folia verticillatim 4-natum ad nodos sita (internodiis mediis 4–5 cm. longis) in ambitu ovato-oblonga petiolata 8–10 mm. longa 4–5 mm. lata apice obtusa vel acuta basi late acuta margine pinuati-secta vel pinnati-loba, lobis utroque latere 5–7 oblongo-triangularibus, mediis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis apice acutis basi latissimis (sinibus inter lobos triangulari-obtusis), margine serrulata, serrulis acutis totis ascendentibus, tenuiter deorsum recurva utraque pagine pilosa supra minus subtus plus crispato-pilosa, petiolis 3 mm. longis dorso complanatis basi gradatim dilatatis 1 mm. latis. Verticillaster 4-floratus

versus apicem caulis densiuscule superpositim dispositus, caulis apice densissime flores 7-8 aggregatim gerens; vel flores ad apicem caulis solum dispositi; bracteis inferioribus cum foliis conformibus minoribus, superioribus gradatim minoribus; pedicelli 1-2 mm. longi exteriore directi subglabri.

Calyx tubuloso-cylindricus  $5\frac{1}{2}$  mm. longus  $2\frac{1}{3}$  mm. latus extus crispato-pilosus basi latere exteriore plus minus ventricosus sursum ad orem plus minus contractus basi rotundatus ad orem obliquus sub 5-dentatus, (dente supremo triangulari  $\frac{1}{2}$  mm. longo, lateralibus inferioribus obscuris), ad marginem crispato-pilosus circ. 15-nervius grosse reticulatus intus glaber deorsum exteriore leviter recurvus. Corolla tubuliformis exteriore directa  $\sim$ -formiter recurva, tubo 9 mm. longo apice plus minus latiore ad orem  $2\frac{1}{2}$  mm. lato glabro, limbo 2-labiato-partito, labro superiore secus longitudinem plicato 6 mm. longo explicato 4 mm. lato plicato 2 mm. lato extus glabro apice cuculliformi, labro inferiore 6 mm. longo 8 mm. lato a labro superiore angulo recto divaricato basi plus minus angustiore apice latiore apice 3-lobato, lobis lateralibus latioribus 2 mm. longis 3 mm. latis apice rotundatis, lobo centrali obovato 3 mm. longo  $1\frac{1}{2}$  mm. lato apice rotundato basi angustiore contracto, sinibus inter lobos rotundatis vel obtusis.

Stamina 4 didynamia, labro superiore inclusa, filamentis longioribus usque ad apicem labri superioris attingentibus basi ad 2 mm. cum tubo corollæ connatis cæterum liberis glabris, antheris iis oppositis contactis obovatis 1 mm. longis apice emarginatis rotundatis basi 2-lobatis (lobis acutis subæqualibus) glabris, connectives haud productis in specimine nostro fusco-coloratis. Discus minutus basi ovarii latere antice ovario connatus vel obsoletus  $\frac{1}{3}$  mm. longus oblongus. Ovarium ovatum circ. 2 mm. longum 1 mm. latum latere compressum apice acutum basi haud vel vix contractum glabrum læve. Fructus ignotus.

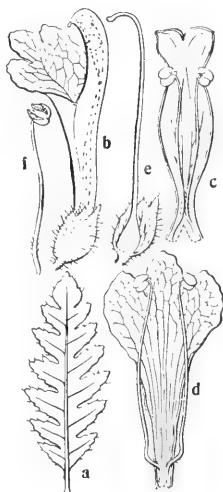


Fig. 46, *Pedicularis transmorisonensis* HAYATA; a, a leaf; b, a flower; c, a detached upper lip; d, a detached lower lip; e, ovary; f, a stamen; all figures  $\times 2.5$ .

HAB. Mt. Morrison, leg. U. MORI.

This alpine plant is the only representative of the genus *Pedicularis* in Formosa. It is very remarkable to notice that the plant bears a close resemblance to *Pedicularis verticillata* LINN. which spreads widely from North America, Western Europe to Kamtschatka and Japan where it is very limited to the highest mountains. Our plant differs very slightly from *P. verticillata* LINN. in having a little narrower longer corolla-tubes, and in the leaves which in this new species are arranged remotely along the whole length of the stem, but not clustered under the flower-heads, as is the case with *P. verticillata*.

*Veronica* LINN.

***Veronica oligosperma* HAYATA** sp. nov. (Fig. 47, a-i). Caulis repens ad nodos radicans teres crispato-pubescens 1mm. in diametro sectionis, internodiis 2-2½ cm. longis. Folia opposita petiolata triangulari-rotundata 14 mm. longa 13 mm. lata apice triangulari-obtusa basi truncata margine lobulata, lobulis utroque latere 2, lobulo centrali late triangulari 4 mm. longo 7 mm. lato apice triangulari-obtusobasi leviter contracto margine integro, lobulis lateralibus 2 dentiformibus ascendentibus obtusissimis margine integris, utraque pagine pilis crispatis articulatis hirsuta, venis utraque pagine haud visis, margine tenuissime deorsum recurva, costa vix vel haud elevata, petiolis 8 mm. longis crispato-pilosis. Racemi axillares erecti cum pedunculis 3 cm. longi crispato-hirsuti 3-4-floriferi, bracteis spatulato-linearibus 5 mm. longis 1 mm. latis apice obtusissimis margine integris ciliolatis extus hirsutis intus glabris basi haud dilatatis haud contractis, pedicellis 7 mm. longis hirsutis erectis. Calyx fere 2-partitus, partibus alte 2-lobatis,

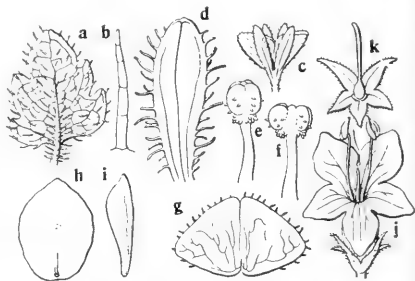


Fig. 47: a-i, *Veronica oligosperma* HAYATA; a, a leaf; b, a hair on a leaf; c, a premature fruit; d, a sepal; e, f, stamens, seen from different sides; g, a premature capsule; h, a seed, seen from front; i, the same, seen from side; j-k, *Veronica spuria* LINN. var. *angustifolia* BENTH.; j, a flower; k, the same, corolla taken off; all figures are more or less magnified.



lobis spathulato-linearibus 5 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusissimis basi attenuatis intus fere glabris vel sparse hirsutis extus hirsutis margine ciliolatis 3-nerviis, nervis parallelis. Corolla haud visa. Ovarium ovato-rotundatum 1 mm. longum totiusque latum glabrum complanatum, stylo filiformi glabro. Capsula triangularis 5 mm. longa 9 mm. lata apice emarginato-bilobata margine ciliolata, valvis apice exteriore reflexis medio ad apicem fissis crasse coriaceis, circ. 15-sperma. Semina valde complanata obovato-oblonga  $1\frac{1}{2}$  mm. longa  $1\frac{1}{4}$  mm. lata lævia in placenta peltatim affixa facie centro impressa a centro usque ad basin tenuiter 1-sulcata; testa tenuissima?; albumen osseum.

HAB. Mt. Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et S. SASAKI, Oct. 1909.

Nothing like this in the Chino-Japanese flora.

**Veronica spuria** LINN. var. **angustifolia** BENTH. (Fig. 47, j-k).

*Veronica spuria* LINN.

in HAYATA Fl. Mont. Formos. p. 175.

**Euphrasia** LINN.

**Euphrasia borneensis**

STAFF (Fig. 48), HAYATA Fl. Mont. Formos. p. 177.

**Euphrasia transmorisonensis** HAYATA sp. nov.

(Fig. 48-A) Herba humilis; caulis basi prostratus sursum ascendens, partibus ascendentibus 6-7 cm. longis, gracilis repens radicans lignescens teres pubescens rubescens. Folia obovato-cuneata 6-7 mm. longa 4 mm. lata apice obtuso-acuta basi cuneata triangulari-cuneata crassiuscula margine dentata, denti-

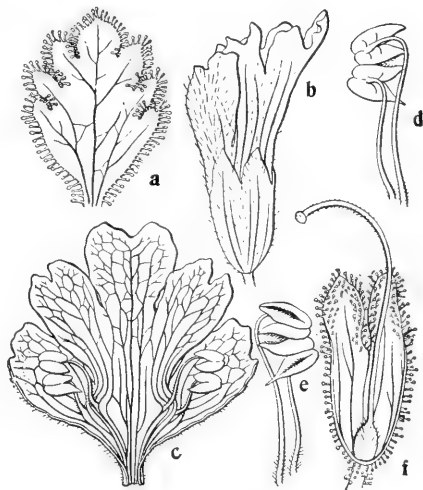


Fig. 48, *Euphrasia borneensis* STAFF; a, a leaf; b, a flower; c, corolla, expanded; d, e, stamens, seen from different sides; f, ovary, calyx partly taken off. All figures are more or less magnified.

bus utroque latere 2 ascendentibus triangularibus, dente terminali circ. 2 mm. longo  $1\frac{1}{2}$  mm. lato apice acuto basi plus minus dilatato, margine minute setuloso-ciliolata, ad marginem crassiuscula deorsum tenuissime recurva, utraque pagine subglabra, costa supra tenuiter sulcata subtus leviter elevata, venis lateralibus primariis utroque latere costae 2 rectis ad sinus dentium attingentibus, petiolis brevissimis obscuris 1 mm. longis, stipulis nullis; folia superiora utraque pagine glanduloso-hirsuta. Flores pauci in axilla foliorum superiorum siti. Calyx campanulatus cylindrico-campanulatus 4 mm. longus 3 mm. latus extus glanduloso-hirsutus, pilis patentibus, intus glaber, lobis 5, lobo postico latiore oblongo 2 mm. longo 1 mm. lato apice obtuso basi haud contracto, lobis lateralibus cum lobo posteriore paullo angustioribus lineari-oblongis extus pilosis intus prope apicem pilosis caeterum glabris. Corolla tubuloso-campanulata cum lobis 13 mm. longa 8 mm. lata extus basin glabra supra basin usque ad infra medium hirsuta medio sursum glabra sursum usque ad medium 2 labiata intus infra medium usque ad supra basin hirsuta; labro inferiore majore cuneato-obtriangulati 8 mm. longo apice totiusque lato basi gradatim cuneato haud contracto utraque glabro apice 3-lobato, lobo medio ovato-quadranguliformi 4 mm. longo 3 mm. lato apice 2-lobulato, (lobulis acutis), lobis lateralibus eo medio conformibus apice 2-lobulatis; labro superiore posteriore quadranguliformi  $4\frac{1}{2}$  mm. longo totiusque lato apice emarginato basi haud contracto extus hirsuto intus apice hirsuto medio extus convexo intus concavo (parte concava oblonga). Stamina 4 subaequilonga, filamentis usque ad medium corolla connatis a medio sursum liberis, partibus liberis 3-4 mm. longis basi hirsutis sursum glabris, antheris totis in parte concava labii superioris insidentibus latere se connatis, antheris inferioribus apice apiculatis basi divaricatim 2-lobatis 2-ocularibus, loculis exterioribus basi setulis longis instructis, loculis interioribus haud setosis acutis, rimis antherarum dense crispato-barbatis, antheris superioribus basi haud setosis. Ovarium oblongo-ovoideum  $1\frac{2}{3}$  mm. longum  $\frac{2}{3}$  mm. latum sursum dense longeque hirsutum, stylo filiformi circ.

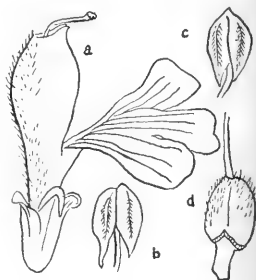


Fig. 48-A, *Fuphrasia transmorrissonensis* HAYATA; a, a flower; b, c, anthers; d, ovary.

1 cm. longo glabro sursum hirsuto; stigmatе globuloso.

*Euphrasia petiolaris* HAYATA Fl. Mont. Formos. p. 177, (non WETTST.).

HAB. Mt. Arisan: Tōzan, leg. G. NAKAHARA, Nov. 1906.

When I was at Kew, I compared this plant with all the specimens of the genus of East Asia, but found nothing like this. Very probably a species not described before.

## Gesneraceæ.

### *Rhynchoglossum* BLUME.

***Rhynchoglossum hologlossum*** HAYATA sp. nov. (Tab. XI.). Herba an-

nua? basi ascendens sursum erecta; caulis cum racemis 40–50 cm. longus pauciramosus subrectus vel plus minus flexuosus. Folia radicalia non visa, caulina obliquissima petiolata ovato-oblonga maxima 11 cm. longa 6 cm. lata apice subito acuminata vel cuspidato-acuminata ad summum obtusiuscula basi obliquissima, latere altero rotundata vel subcordata, latere altero acuta a basi laminae usque ad  $1\frac{1}{2}$  cm. altitudinem fracta, latere medio altero 2 cm. lato, latere medio altero 3 cm. lato, margine integerrima tenuissime membranacea supra subglabra subtus minute brevissime sparsissimeque pubescentia, costis venisque utraque pagine vix vel haud elevatis, venis lateralibus primariis utroque latere costae 15–17 subparallelis, mediis a costa angulo  $45^\circ$  egressis gradatim areuatis haud ramosis simplicibus sursum prope apicem secus marginem ascendentibus, venulis gracillimis supra non visis subtus visis haud reticulatis, pagine supra viridia subtus pallidissima, petiolis laminam  $\frac{1}{3}$ -plo in longitudine aequantibus  $3\frac{1}{2}$  cm. longis subglabris, stipulis subulato-linearibus 2–3 mm. longis vel obsoletis. Racemi terminales simplices cum pedunculis 10–20 cm. longi, in fructu plus elongati subglabri, pedunculis 5 cm. longis subglabris; rhachis racemorum gracilis oblique recurva flores secundum gerens latere altero glabra latere altero florigero dense hirsuta, floribus alternis inferioribus a se 1 cm. superioribus plus approximatis, pedicellis 2–3 mm. longis dense hirsutis basi bracteatis, bracteis linearibus subteretibus 2–3 mm. longis  $\frac{1}{2}$  mm. latis pedicello brevioribus hirsutis paucе setulosis cum pedicello a basi usque ad medio conuatis sursum liberis; floribus oblique a rhachibus racemorum angulo recto divaricatis vel subpendulis. Calyx cylindrico-campanulatus cum lobis 4–5 mm. longis  $2\frac{1}{2}$  mm. latus minute hirsutus basi

tenuiter 5-carinatus a medio sursum 5-lobus, lobis valvatis elongato-triangularibus, superioribus quam inferiore paullo brevioribus 2-3 mm. longis 1-1½ mm. latis apice acutis margine exteriori sursum recurvis (haud deorsum haud inferiore recurvis) margine minute argute serrulatis apice interiore paullo recurvis. Corolla tenuissima subrecta cylindrica cum lobo inferiore 12 mm. longa medio 2 mm. lata utraque pagine minutissime hirsuta, tubo 7 mm. longo recto cylindrico, limbo 2-labiato, labro superiore breviori oblongo-triangulari 2½ mm. longo 2 mm. lato apice 2-lobato (lobis rotundatis ⅔ mm. longis) deorsum exteriori reflexo basi inter tubum et limbum carina transversa exteriori recurva  $\sim$ -formi instructo, parte infra carinam subinflata ad tubum abeunti; labro superiore rotundato-obovato 5-5½ mm. longo 5 mm. lato apice haud lobato margine subundulato basi plus minus contracto basi carina elevata singula exteriori  $\nabla$ -formiter recurva instructo, parte infra carinam subinflata ad tubum abeunti. Stamina 2, filamentis usque ad medium tubo corollae connatis sursum liberis, partibus liberis 2 mm. longis glabris, antheris 2-ocularibus  $\infty$ -formibus ½ mm. longis 1 mm. latis, loculis se confluentibus apice cum iis antherarum alterarum oppositarum junctis. Discus semi-annuliformis basi ovarii situs et basin ovarii semi-amplexans ½ mm. altus. Ovarium ovatum 2 mm. longum 1½ mm. latum apice acutum ad stylum abeuns glabrum, stylo columnari-filiformi 4 mm. longo stamina superanti glabro sursum deorsum recurvo, stigmate terminali peltato-globo ⅓ mm. in diametro. Calyx in fructu persistens sed haud accrescens haud inflatus capsulam amplexans. Capsula ovoidea 4 mm. longa 2 mm. lata apice acuta basi plus minus contracta glabra calycibus complete inclusa 2-valvata, valvis glabris castaneis coriaceis intus medio placentiferis, placentis coriaceis minute tuberculatis. Semina castanea minuta ellipsoidea ½ mm. longa ⅓ mm. lata minute elevato-reticulata; testa membranacea.

*Rhynchosglossum obliquum* HAYATA Fl. Mont. Formos. p. 178 (non BLUME).

HAB. Rinkihō, Aug. 1911, Fl., leg. H. INABA, typus!; Mt. Randaisan, leg. B. HAYATA et U. MORI, Aug. 1908 (No. 7098); Taichū: Sekikakusan, leg. U. MORI, Aug. 1906; Kishitō, leg. G. NAKAHARA, Aug. 1905 (No. 339); Shintiku: Taiko, leg. T. KAWAKAMI, Aug. 1910; Kōdenshō, leg. S. NAGASAWA, Oct. 1906; Kagi: Kishirei, leg. U. MORI, Oct. 1907, (No. 1777).

Very near *R. obliquum* BLUME; it is impossible to find the distinction between that species and our new one without dissecting flowers, so much closely do they resemble in appearance. The difference between them is shown as follows:

<i>R. obliquum</i>	<i>R. hologlossum</i>
Corolla-tube cylindric contracted at the mouth, lower lip of the corolla 3-lobed; stigma minutely 2-lobed.	Corolla-tube cylindric not at all contracted at the mouth, lower lip of the corolla entire, not lobed; stigma globose entire, not lobed.

CLARKE says, in HOOK. f. Fl. Brit. Ind. IV. p. 367, "Leaves (of *R. obliquum*) 1- $\frac{1}{2}$  in."; but this could never be the case with any species of the genus. I presume this is due to a misprint.

*R. obliquum* BLUME var. *parviflora* CLARKE (= *R. zeylanicum* HOOK. in Bot. Mag. t. 4198) agrees fairly well with our *R. hologlossum*; the only difference is that in the former the lower lip of the corolla is 3-lobed, while in the latter the lip is entire. In respect of the relative length of the lips and the corolla-tubes, the new species accords very well with *R. zeylanicum* HOOK. HOOKER says in the note of Bot. Mag. t. 4198 that "the genus is *Loxotis* of Mr. BROWN, in HORSFIELD'S Plants of Java, Fasc. I. p. 102, t. 24, and the species there admirably figured and described, so much resembles the present one, that at first I was unwilling to consider them distinct; but in all the many flowers I have examined, there is uniformly in our plant such a difference in the lower lip, short and broadly ovate, not twice the length of the upper lip, and shorter than the tube — in Mr. BROWN'S *Loxotis obliqua* oblong or strap-shaped, longer even than the tube of the corolla, obscurely tridentate, that I cannot but describe the present as new." As is seen in the statements made by HOOKER, our plant is nearer to *R. zeylanicum* than to *R. obliquum*. Still, ours is different from *R. zeylanicum* in having entire lower lip of the corolla.

#### *Chirita* HAM.

***Chirita minuteserrulata*** HAYATA sp. nov. (Tab. XII. et Fig. 49). Herba; caulis simplex vel paucè ramosus glaberrimus vel subglaber, internodiis 8 cm. longis. Folia opposita longe petiolata, lamina in magnitudine variabilissima oblonga vel ovato-oblonga vel ovato-rhomboidea, maxima 11 cm. longa 6 cm

lata apice triangulari-acuta basi triangulari-acuta obliqua vel æqualia obtusa vel oblique rotundata margine minute tenuissimeque serrulata membranacea, supra plus subtus sparsissime pubescentia, costis venisque utraque pagine tenuissime elevatis vel haud elevatis, venis lateralibus primariis utroque latere costæ 7-9 prope costam rectis mediis a costa angulo  $60^\circ$  egressis sursum arcuatis prope apicem evanescentibus, petiolis laminam  $\frac{1}{2}$ -plo æquantibus subglabris basi dilatatis, stipulis nullis. Cymæ axillares vel terminales longe pedunculatæ, pedunculis subrectis 5-7 cm. longis glabris 3-5-floratis, pedicellis 5-10 mm. longis basi bractea una instructis, bracteis in magnitudine variabilissimis superioribus minoribus ovatis apice triangulari-acutis basi valde contractis rotundatis margine dense aristato-ciliatis facie glabris 7 mm. longis  $5\frac{1}{2}$  mm. latis apice triangulari-obtusis basi rotundatis vel late triangulari-acutis ad insertionem  $\frac{1}{2}$  mm. latis utraque pagine glabris, pedicellis glabris brevissimis vel longioribus generaliter 1-2 cm. longis. Calyx cylindrico-campanulatus cum lobis 13 mm. longus 5-lobatus 15-nervius grosse reticulatus intus extusque glaber medio 6-7 mm. latus, lobis elongato-triangularibus subæqualibus 4 mm. longis basi 3 mm. latis apice acuminatis basi latissimis integris

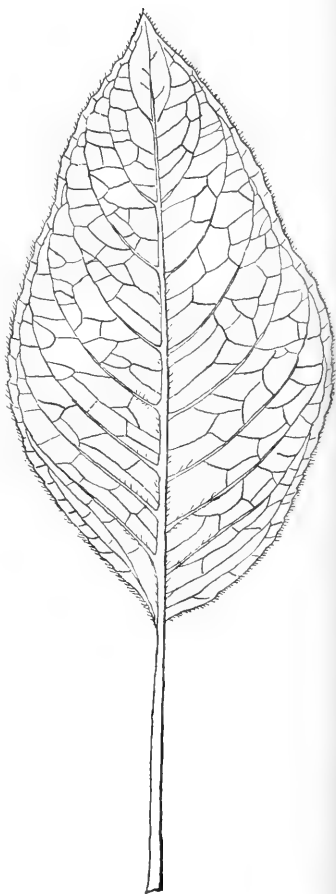


Fig. 49, a leaf of *Chirita minuseserrulata* HAYATA.

margine interiore tenuiter recurvis dense ciliolatis. Corolla cylindrico-subcampanulata  $3\frac{1}{2}$  cm. longa apice gradatim latior  $1-1\frac{1}{2}$  cm. lata tenuissima glabra apice 2-labiata, labro superiore brevior 2-lobato, labro inferiore longiore 3-lobato, lobis æqualibus rotundatis 4-5 mm. longis totiusque latis apice rotundato-truncatis subintegris basi vix vel haud contractis. Corolla extus glabra intus infra medium latere inferiore tenuiter longe barbata tenuissime venosa, venis sursum plus minus reticulatis. Stamina inclusa inferiora 2 perfecta, superiora 2 ad staminodia reducta, stamina perfecta e basi corollæ sursum  $\frac{1}{3}$  altitudine oriunda, filamentis glabris latiusculis 5 mm. longis complanatis, connectivis filamentis subæquilongis vel eo brevioribus glabris apice latis loculum antheræ singulum gerentibus, antheris uni-ocularibus semi-rotundatis ei staminis alterius connatis. Staminodia 2 vermiformia 3-4 mm. longa complanata linearia apice setosa. Discus ad basin stipitis ovarii situs annuliformi-cupuliformis  $1\frac{1}{2}$  mm. latus  $\frac{1}{2}$  mm. altus. Ovarium lineare circ. 1 cm. longum 1 mm. latum subcomplanatum stipitatum, stipitibus  $\frac{1}{3}$  cm. longis, stylo incluso circ.  $\frac{1}{2}$  cm. longo glabro apice 2-labiato, labris patentibus oblongis  $2\frac{1}{2}$  mm. longis 1 mm. latis obtusis. Fructus maturus ignotus; præmaturus longe angustissime linearis 8 cm. longus 1 mm. latus glaber haud tortuosus.

HAB. Bôho, leg. H. INABA, Juli. (fl.), 1911 (typus!).

*Chirita anachorata* HANCE? in HAYATA Mater. Fl. Formos. p. 212.

Near *C. anachorata* HANCE, but differs from it in the more minutely serrulate leaves, in the calyx which is cleft to one third of the length, in the much longer petioles and in the broader bracts.

## Acanthaceæ.

### *Strobilanthes* BLUME.

***Strobilanthes flexicaulis*** HAYATA sp. nov. (Fig. 50). Herba usque ad 1 mm. alta. Caulis angulatus flexuosus, ramis ramulis flexuosis glabris. Folia alterna ovata vel oblongo-ovata  $4\frac{1}{2}$  cm. longa 16 mm. lata apice cuspidato-acuminata ad summum obtusa basi rotundata ad extremitatem subito acuta ad petiolum 3 mm. longum abeuntia margine serrata, costa venaque supra plus elevata subtus minus elevata, venis lateralibus primariis utroque latere 4-5 arcuatis, utraque pagine tenuissime adpresseque pubescentia vel subglabrata in

exsiccatum supra fuscentia subtus pallida membranacea, petiolis 2-3 mm. longis. Flores quasi-axillares sessiles 2-bracteolati, bracteolis linearibus 8 mm. longis 1 mm. latis fere glabris 1-costatis integris basi calyce connatis. Calyx subcylindrico-campanulatus fere usque prope basin 2-fissus; segmento inferiore alte 2-partito, partibus 1 cm. longis linearibus apice obtusis deorsum plus minus latioribus  $1\frac{1}{2}$  mm. latis extus

sparse glanduloso-ciliolatis deorsum glabratis intus sursum hirsutis; segmento superiore usque ad medium trilobato, lobis linearibus 6 mm. longis 1 mm. latis apice obtusis totis erectis. Corolla caerulea vel purpurea tubulato-campanulata cum lobis 4 cm. longa apice  $1\frac{1}{2}$  cm. lata extus glabra deorsum tubuliformis, partibus tubuliformibus  $1\frac{1}{2}$  cm. longis 4 mm. latis, sursum

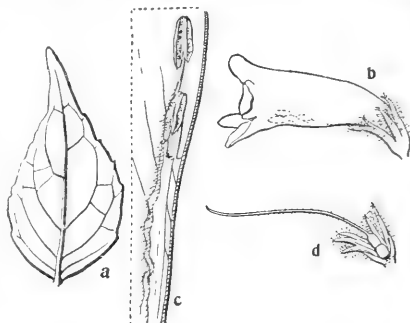


Fig. 50. *Strobilanthes flexicaulis* HAYATA; a, a leaf; b, a flower; c, portion of corolla, showing stamens; d, ovary with calyx; a, b, d, natural size; c, magnified.

gradatim campanulato-dilatata apice 2-labiata, labro superiore 4 mm. longo, labro inferiore 1 cm. longo latiore quam eo superiore, labro superiore 2-lobato (lobis semi-rotundatis 5 mm. longis 8 mm. latis apice rotundatis), labro inferiore 3-lobato (lobo centrali rotundato 6 mm. longo 7 mm. lato apice rotundato basi contracto, lobis lateralibus eo centrali aequilongis sed latioribus plus minus obliquis a lobo centrali angulo recto divaricatis), lobis omnibus margine integris remote ciliolatis; tubo intus prope faucem latere inferiore hirsuto. Stamina 4, filamentis usque ad  $\frac{4}{5}$  altitudinem corollae connatis sursum liberis hirsutis se approximatis sursum latere inferiore convergentibus, partibus liberis 2-3 mm. longis hirsutis, duobus longioribus duobus brevioribus; antheris lineari-oblongis  $3\frac{1}{2}$  mm. longis 1 mm. latis ad  $\frac{2}{3}$  altitudinem filamentis affixis glabris apice obtusis basi bilobatis. Discus cylindricus 1- $1\frac{1}{3}$  mm. altus 1 mm. latus glaber. Ovarium obovoideum 2 mm. longum 1 mm. latum, stylo filiformi cum staminibus aequilongo paucis brevissimeque hirsuto apice subulato-acuminato ad stigma





abeunti.

HAB. Mt. Arisan, Jan. 1912, leg. B. HAYATA et S. SASAKI.

## Aristolochiaceæ.

### *Aristolochia* LINN.

***Aristolochia cucurbitifolia* HAYATA** sp. nov. Herba volubilis; caulibus vel ramis subteretibus 3 mm. in diametro levibus vel longitudinaliter sulcato-striatis pubescentibus vel subglabris volubilibus volubili-flexuosis fulvescentibus, pulvinis prominente elevatis circ. 2 mm. longis. Folia alterna chartacea palmatim 7-lobata 7-9 cm. longa 8-11 cm. lata in ambitu rotundato-cordata basi cordata -formia alte usque ad  $\frac{2}{3}$  longitudinis lobata, lobo centrali spatulato-ensiformi vel rhomboideo-oblanccolato  $5\frac{1}{2}$ -8 cm. longo 2-3 cm. lato apice triangulari-acuto ad summum acuto sursum dilatato, partibus dilatatis rhomboid-alibus, deorsum gradatim attenuato-angustato ad 6-8 mm. latitudinem attenuato, lobis lateralibus (exceptis lobis basilaribus) oblanccolato-linearibus subrectis vel plus minus interiore recurvis sed generaliter rectis quam lobo terminali brevioribus angustioribus, lobis basilaribus auriculiformibus latioribus semi-oblongis apice triangulari-obtusis vel -acutis latere superiore rectis latere inferiore rotundatis recurvis, sinibus inter lobos lineari-obtriangularibus fundo truncato-rotundatis vel obtusissimis foliolo terminali 2-plo latioribus, sinibus cordis basalis foliorum M-formibus latioribus; pagina supra glabra pallido-fuscens subtus hirsuta fulvo-cinereascens, pilis fulvescentibus, nervis supra tenuiter elevatis subtus prominente elevatis, venis venulis supra tenuiter impressis subtus elevatis, reticulis venularum distincte visis subtus elevatis; nervis pedatim dispositis 7, nervo centrali recto ad apicem lobi terminalis attingenti, nervis lateralibus juxta nervum centalem rectis a nervo centrali angulo  $45^\circ$  egressis subrectis ad apicem lorum attingentibus, nervis lateralibus juxta nervum basilem a nervo centrali angulo recto egressis subrectis ad apicem lorum lateralium attingentibus basi cum nervis lateralibus usque ad 3 mm. connatis, nervis basilaribus sursum recurvis a nervo centrali angulo  $135^\circ$  egressis basi cum nervis lateralibus juxta nervum basilem usque ad 8 mm. longitudinem connatis sursum recurvis ad apicem lorum basilarium attingentibus; nervo centrali longissimo, nervis lateralibus gradatim brevioribus, nervis basilaribus brevissimis, venis lateralibus primariis deorsum a

costa angulo recto egressis sursum angulo circ. 45° egressis, venulis eleganter distincteque reticulatis, petiolis 3 cm. longis foliolum in longitudine  $\frac{1}{3}$ -plo aequantibus, volubilibus intus sulcatis subglabris vel hirsutis. Flores penduli quasi-axillares solitarii longo-pedicellati, pedicellis gracillimis 3 cm. longis dense brevissimisque hirsutis medio 1-bracteatis, bracteis oblongo-ovatis 1 cm. longis 4-5 mm. latis apice obtusissimis basi plus minus angustatis margine integris deorsum recurvis basi pedicellum amplexantibus. Ovarium patento-pilosissimum a pedicello angulo recto flexum cylindricum hirsutum 6 mm. longum  $2\frac{1}{2}$  mm. latum dense hirsutum profunde 6-sulcatum in sectione 6-radiatum 6-lobatum 6-loculare apice ad basin tubi perianthii constrictum. Perianthii tubus U-formiter recurvatus extus patento-pilosissimus apice ad limbum peltatum expans, tubo cylindrico (limbis exceptis) 4 cm. longo a basi sursum usque ad  $\frac{2}{3}$  longitudinis 6-7 mm. lato sursum angustato 3 mm. lato, partibus angustatis 1 cm. longis, extus toto patento-hirsuto longitudinaliter multo striato inter strias reticulato; limbo obliquissime peltatum cum partibus angustatis tubi perianthii juncto subintegro in ambitu oblongo  $1\frac{1}{2}$  cm. longo 1 cm. lato ad medium compliciter plicato apice emarginato-2-lobato extus hirsuto intus glabro circa orem tubi elevato-purpureo-marginato; tubus perianthii in sectione basi cordatus, intus a basi usque ad 1 mm. altitudinem glaber a supera partem glabram usque ad 7 mm. altitudinem dense rubro-hirsutus, intus toto fuscens. Stamina 6 e basi partis elevatae perianthii oriunda cum stylo toto connata, filamentis totis cum stylo connatis glabris  $\frac{1}{2}$  mm. longis, antheris inter strias stigmatiferas geminatim sitis linearibus  $1\frac{1}{3}$  mm. longis 2-ocularibus. Stylus columnaris  $3\frac{1}{2}$  mm. longus circ. toto longitudine cum staminibus connatus sed supra antheras  $1\frac{1}{2}$  mm. productus crassus, striis stigmatiferis 3 ad apicem stylum se convergentibus 2 mm. longis nigricantibus. Capsula ovoideo-fusiformis 3 cm. longa 1 cm. lata basi attenuata apice fusiforme acuta prominente 6-costata septicide? dehiscens. Semina numerosa in ambitu triangulari-ovata  $4\frac{2}{3}$  mm. longa  $3\frac{1}{2}$  mm. lata apice triangulari-obtusa basi rotundata dorso valde convexa ventrali valde concava sed medio septata medio in sectione -formia, testa membranacea rubescens sed cinereo-sebifera; albumen osseo-cereum; embryo ignotus.

HAB. Kagi: Baiakō, leg. T. KAWAKAMI, Aprili. 1909, (fl. typ.); Shintiku: Shinpō, leg. T. KAWAKAMI, 1907, (fr.).

Somewhat allied to *Aristolochia Fordiana* HEMSL. in Journ. Bot. (1885) p. 286, and *Aristolochia Kempferi*, but differs altogether from them in having deeply 7-9-lobate leaves.

*Asarum* LINN.

*Asarum albomaculatum* HAYATA.

sp. nov. (Fig. 51). Rhizoma repens dense radicans, radicibus teretibus incrassatis circ. 2 mm. in diametro, cicatricibus foliorum semi-annuliformibus notatum apice caulescentes. Caulis suberectus circ. 1 cm. longus subglaber 2-3-foliatus, foliis generaliter sursum congestis cum squamis intermixtis, squamis 2-3 caducissimis triangulari-oblongis apice acutis membranaceis in exsiccatto semi-hyalinis reticulato-nervosis basi latissimis caulem amplexantibus. Folia longe petiolata, petiolis 3-6 cm. longis subglabris teretibus  $1-1\frac{1}{2}$  mm. in diametro basi plus minus dilatatis caulem semi-amplectantibus intus subsuleatis ad sulcos breve pubescentibus, lamina cordato-oblongo-triangulari (ab apice petioli usque ad apicem laminæ) 7-5 cm. longa  $5\frac{1}{2}-3\frac{1}{2}$  cm. lata apice triangulari-acuta vel plus minus cuspidato-acuta ad summum breve apiculata basi auriculato-cordata, auriculis vel lobis cordis (a fundo sinus inter lobos cordis usque ad apicem lobi cordis)  $2-2\frac{1}{2}$  cm. longis  $1\frac{1}{2}-2\frac{1}{2}$  cm. latis apice rotundatis, sinibus inter lobos cordis  $\sigma$ -formibus latioribus interdum angustioribus, margine remote brevissime hirtella, pilis ascendentibus  $\frac{1}{4}$  mm. longis  $\sigma$ -formibus, pagine utraque subglabra

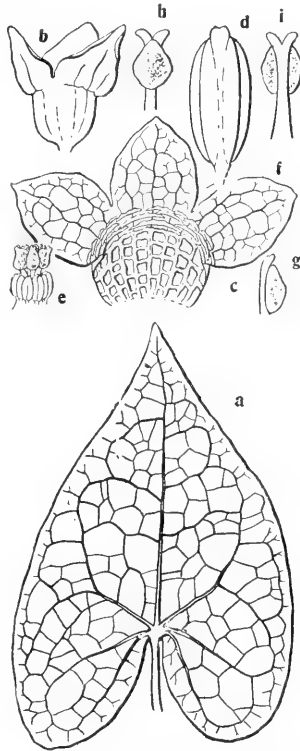


Fig. 51. *Asarum albomaculatum* HAYATA; a, a leaf; b, a flower; c, perianth, expanded; d, a stamen; e, stigmata and anthers; f, g, h, a stigma, seen from different sides.

hirtella, pilis ascendentibus  $\frac{1}{4}$  mm. longis  $\sigma$ -formibus, pagine utraque subglabra

prope basin plus minus hirtella, 5-nervia vel obscure 7-nervia, pagina supra utroque latere costæ nubilo-albo-marmorata vel maculata cæterum opaco-viridescens, pagine subtus pallidior, nervis lateralibus basi rectis medio furcato-ramosis; textura membranacea, reticulis venularum haud vel vix visis. Flores quasi-terminales solitarii nutantes, pedicellis 1 cm. longis glabris basi stipulis foliorum singulis instructis, stipulis explicato ovatis 7-8 mm. longis 6 mm. latis semi-hyalinis acutis ad medium plicatis margine dense ciliolatis, ciliis deorsum reflexis, ad costam ciliatis. Perianthii tubus latior quam longior 1 cm. longus 13 mm. latus ad orem plus minus constrictus extus glaber rugulosus intus grosse tessellato-reticulatus, reticulis valde elevatis, arcolis intrareticularibus impressis quadrangularibus 2 mm. latis, circum orem tubi annulis 1 mm. latis deorsum reflexis instructus, limbo patenti 3-partito vel 3-lobato, lobis rotundato-triangularibus 9 mm. longis 11 mm. latis apice triangulari-acutis basi plus minus contractis basi circum orem intus supra rugosissimis supra basin usque ad apicem supra haud rugosis sed brevissime crispato-hirsutis subtus glabris levibus. Stamina 12 sub apice ovarii connata sessilia, antheris adnatis lineari-quadrangularibus 2 mm. longis 1 mm. latis 2-locularibus, loculis linearibus ad marginem at latus dorsale connectivorum adnatis, connectivis  $2\frac{1}{3}$  mm. longis  $\frac{2}{3}$  mm. latis apice plus minus productis. Ovarium semi-superius vel fere superius, partibus superioribus 5 mm. longis, 6-loculare, carpellis 6 apice distinctis, partibus distinctis 2 mm. longis latere complanatis, glabris, stigmatibus infra apicem ad latus exterius carpellorum lateraliter sitis globulosis; carpellis apice simplicibus vel brevissime 2-lobatis; semina ignota.

HAB. Arisan, Nimandaira, ad 6500 ped. alt., leg. T. ITÔ et B. HAYATA, Aprili. 1914.

Near *Asarum taiwanense* HAYATA, but differs from it in having much acuter leaves.

**Asarum epigynum** HAYATA sp. nov. Rhizoma repens. Folia secus rhizoma remote sita ovata vel ovato-lanceolata  $4\frac{1}{2}$  cm.-7 cm. longa  $2\frac{1}{2}$ -4 cm. lata apice acuto-obtusa basi cordata, sinibus cordis acuto-triangularibus  $\wedge$ -formibus, margine subintegra ad marginem ciliolata supra atro-viridia glabra subtus pallidissima subglabra vel subhirsuta ad nervos hirsuta 3-7-nervia, nervis juxta centalem lateralibus ascendentibus cum nervo centrali subparallelis,

petiolis 2-3 cm. longis crispato-hirsutis. Flores quasiterminales vel e basi foliorum oriundi, pedicellis  $1\frac{1}{2}$  cm. longis crispato-hirsutis. Perianthii tubus plus minus obliquus 12 mm. longus 8-9 mm. latus obconico-cylindricus apice ad orem laud vel vix contractus basi obconicus ad pedicellum abeuns extus crispato-hirsutus, pilis ecoloratis, intus supra ovarium exsertus 5 mm. longus intus partibus inferioribus 2 mm. longis exceptis nigro-pilosus, partibus inferioribus glaberrimis; limbo patenti 3-partito, lobis late triangulari-reniformibus vel triangulari-rotundatis 8 mm. longis 11-12 mm. latis latioribus quam longioribus margine integris apice triangulari-obtusissimis basi plus minus contractis extus subtus pilosis, pilis ecoloratis, intus supra nigro-pilosis, pilis crispatis longioribus. Stamina 12 perfecte epigyna vel plus minus perigyna ad basin partis liberæ perianthii affixa, filamentis 1 mm. longis complanatis  $\frac{2}{3}$  mm. latis, antheris linearibus  $1\frac{1}{2}$  mm. longis  $\frac{3}{4}$  mm. latis, connectivis apice productis, partibus productis oblongis  $\frac{1}{2}$  mm. longis  $\frac{1}{4}$  mm. latis obtusis. Ovarium perfecte inferum 6-7 mm. longum apice leviter convexum glabrum, stylo glabro 2 mm. longo validissimo totiusque lato glabro apice 6-lobato, lobis rotundatis latere valde compressissimis apice rotundatis dorso apice latere exterioreque stigmatosis.

HAB. Formosa, loco non indicato, leg. T. SÖMA.

Remarkable for the perfectly epigynous perianth and the leaves with lateral nerves running nearly parallel to the central one. Resembles very much *Asarum geophilum* HEMSL. (Bot. Mag. t. 7168) in having quite connate styles which are 6-lobed at the apex with decurrent stigmas, in the stamens with connectives producing to an obtuse cone, and in the quite inferior ovary: but distinguishable from it by the lanceolately ovately cordate leaves.

**Asarum grandiflorum** HAYATA sp. nov. (Fig. 52). Rhizoma repens teres, cicatricibus foliorum et cicatricibus squamarum approximativè notatum, cicatricibus foliorum pulviniformibus, cicatricibus squamarum transverse —formibus, repens vel ascendens infra dense radicans, radicibus teretibus, apice caulescens. Caulis 1-3 cm. longus glaber validus 4 mm. in diametro 3-4-foliatus, foliolis cum squamis intermixtis. Folia chartacea vel chartaceo-membranacea longe petiolata, petiolis circ. 20 cm. longis glabris in exsiccatò fusco-nigricantibus, lamina elongato-cordato-triangulari 15 cm. longa 12-13 cm. lata apice triangulari-

acuminata basi late cordata, lobis cordis a se angulo 130–140° divaricatis 6 cm. latis brevibus, distincte 7-nervia, nervis supra impressis subtus elevatis glabris, utraque pagine glaberrima subtus pallidissima, reticulis venularum haud visis, stipulis triangulari-ovatis tenuissimis scariosis 7 mm. longis margine ad costam ciliolatis ad medium plicatis alabastrum foliorum complete obtegentibus. Flores crassiusculi quasi-axillares solitarii extus subviridescentes, pedicellis 13 mm. longis. Tubus perianthii late urceolatus  $1\frac{1}{2}$  cm. latus 12 mm. longus extus glaber rugosus basi truncatim contractus ad orem constrictus ad constrictionem 12 mm. latus intus tessellatim et alveoliforme reticulatus, (reticulis valde purpureis elevatis, arcolis intrareticularibus valde impressis), circum orem membranis deorsum reflexis instructus, membranis breve infundibuliformibus 4 mm. longis ad marginem inferiorem undulatis, limbo horizontaliter patentissimo cum lobis 4 cm. in diametro extus subtus pallido-flavo intus supra viridescenti circum orem tubi multiscriatim subcirculariter plicato-ruguloso, rugulis 2 mm. elevatis versus medium loborum limbi gradatim minoribus demum ad nullum abeuntibus, 3-lobato, lobis late rotundato-triangularibus 13 mm. longis 16 mm. latis latioribus quam longioribus apice acutis vel obtusis basi plus minus contractis ad basin 13 mm. latis margine subintegris supra atro-purpurascens marginem viridescens ad paginam supra rugoso-cristato-reticulatis subtus sublevis marginem valde doreo reflexis fusco-purpurascens. Stamina 12 subsessilia, vel filamentis brevissimis  $\frac{1}{2}$  mm. longis 1 mm. latis glabris complanatis, antheris oblongis cum connectivis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis adnatis 2-locularibus, loculis linearibus ad latus dorsale connectivorum adnatis, connectivis latissimis  $1\frac{1}{2}$  mm. latis complanatis apice productis, partibus productis late obtuse triangularibus  $\frac{1}{2}$  mm. longis. Ovarium semisuperius 5–6 mm. longum totiusque latum 6-loculare glabrum læve; carpellis 6 superiore liberis erectis haud vel vix patentibus



Fig. 52, *Asarum grandiflorum* HAYATA; flowers, one, seen from front; the other, seen from back; natural size.

oblongis cum connectivis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis adnatis 2-locularibus, loculis linearibus ad latus dorsale connectivorum adnatis, connectivis latissimis  $1\frac{1}{2}$  mm. latis complanatis apice productis, partibus productis late obtuse triangularibus  $\frac{1}{2}$  mm. longis. Ovarium semisuperius 5–6 mm. longum totiusque latum 6-loculare glabrum læve; carpellis 6 superiore liberis erectis haud vel vix patentibus

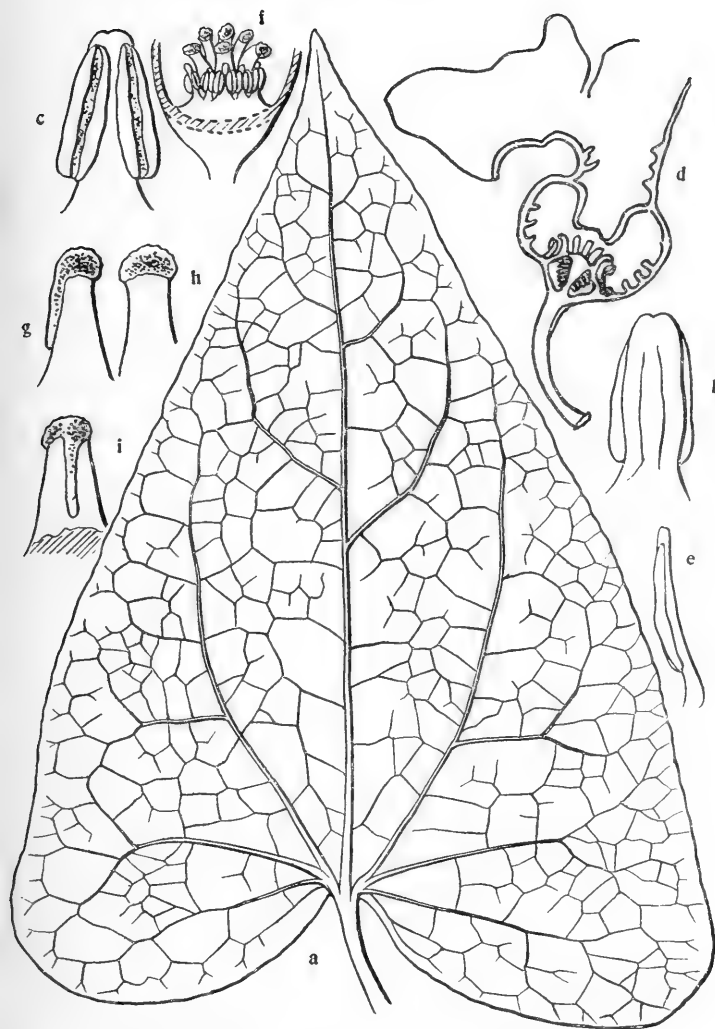


Fig. 52, *Asarum grandiflorum* HAYATA; a, a leaf; d, vertical section of a flower; c, a stamen; b, the same, seen from within; e, the same, seen from side; f, ovary with stamens; g, a stigma; h, the same, seen from within; i, the same, seen from without; a, d, natural size; the others more or less magnified.

latere complanato-triangularibus 2 mm. longis apice stigmatibus coronatis, stigmatibus capituliformibus sed ad faciem anteriorem carpellorum lineariter decurrentibus, loculis carpellorum elongatis, ovulis 10 in loculo singulo 2-seriatim dispositis anatropis pendulis, placentis axialibus.

HAB. Mt. Arisan, Nimandaira, Aprili. 1914, leg. B. HAYATA et T. ITÔ.

Near *Asarum maximum* in the size of the flowers, leaves and petioles; but different from it by the funnel-shaped appendages at the mouth of the perianth-tubes, in the reticulation on the inner side of the same-tubes, in the truncate anthers and in the terminal stigmas.

**Asarum grandiflorum** HAYATA var. **colocasiifolium** HAYATA n. v. Rhizoma horizontaliter repens haud rectum subflexuosum teres cicatricibus foliorum et squamarum notatum in exsiccato fusco-nigricans, cicatricibus foliorum pulviniformibus, cicatricibus squamarum transverse  $\sim$ -formibus, glabrum infra dense radicans, radicibus teretibus incrassatis 2 mm. in diametro, sursum caulescens. Caulis brevis 1-2 cm. longus apicem versus approximativè 2-4-foliatus glaber in exsiccato fusco-nigricans, foliis cum squamis intermixtis, squamis ovato-oblongis apice acutis 1 cm. longis in exsiccato semi-hyalino-membranaceis reticulato-nervatis basi latissimis semi-amplexicaulibus sursum margineque rufo-hirsutis. Folia herbaceo-membranacea longe petiolata, petiolis glabris 20-30 cm. longis, lamina elongato-auriculato-cordato-oblonga ab apice petioli usque ad apicem laminae 12-15 cm. longa 8-9 cm. lata apice triangulari-acuta vel triangulari-acuminata basi profunde auriculato-cordata, auriculis vel lobis cordis (a fundo sinus cordis usque ad apicem lobi cordis) 4-6 cm. longis 4 cm. latis apice rotundatis, sinibus cordis angustioribus, margine integra haud ciliata supra glaberrima subtus costis venis exceptis glabra, costis venisque supra impressis subtus elevatis paucissime hirsutis, distincte 7-nervia supra atro-viridi subtus pallidissima, reticulis venularum haud visis. Flores ut typicae.

HAB. Mt. Arisan, Nimandaira, leg. B. HAYATA et T. ITÔ, Aprili. 1914.

**Asarum hypogynum** HAYATA sp. nov. (Fig. 53). Petiolus 30 cm. longus glaber, lamina oblonga ab apice petioli usque ad apicem laminae 12 cm. longa medio totiusque lata apice subacuta vel obtusa basi profunde cordata, lobis cordis longioribus ab apice petioli usque ad apicem loborum 6 cm. longis se approximatis vel se imbricatis, margine integra vel minute crispato-crenolata



deorsum tenuissime recurva et tenuissime angustissime subcartilagineo-marginata supra glabra viridissima nitida subtus pallidissima ad nervos hirsuta 5-7-nervia, nervis palmatim dispositis. Flores quasiterminales solitarii, pedicellis 1-2 cm. longis glabris. Perianthii tubus intus atro-purpureus  $1\frac{1}{2}$  cm. longus subrotundato-conicus 13 mm. latus supra basin usque ad infra medium latissimus sursum gradatim minus latus ad orem plus minus constrictus 7 mm. latus extus glaber sublævis intus glaber sed grosse reticulatus, reticulis valde elevatis, ad orem annulis infundibuliformibus deorsum reflexis instructus, infundibulis 4 mm. longis extremitate inferiore angustioribus; limbo basi circum orem viridi-flavo cæterum atro-purpureo sed ad marginem viridescenti fere patenti sed basi plus minus tubiformi basi intus circum orem verrucis irregularibus annulariter disposito leviter 3 lobato, lobis semi-rotundatis apice rotundatis 1 cm. longis circ. 2 cm. latis deorsum recurvis supra minute et adpresse hirsutis, pilis toto adpressis, subtus glabris. Stamina 12 ad medium ovarii affixa sessilia, antheris oblongis cum connectivo 3 mm. longis 2 mm. latis, loculis 2 linearibus angustissimis, connectivis latiusculis apice vix productis, partibus productis obtusissimis  $\frac{1}{2}$ - $\frac{3}{4}$  mm. longis. Ovarium fere superius basi vix cum perianthio connatum, partibus liberis conicis 8 mm. longis 1 cm. latis apice 6-lobatis, lobis erectis validis apice ad latus exterius stigmatiferis, stigmatibus globosis.

HAB. Mt. Arisan, leg. B. HAYATA, 1912, Jan.

Remarkable for its nearly superior ovary and in its comparatively short lobes of the perianth.

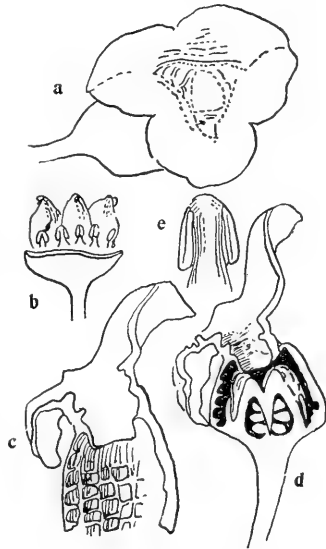


Fig. 33, *Asarum hypogynum* HAYATA; a, a flower; d, the same, in section; c, perianth in vertical section, showing the tessellate reticulation on the inner surface of the perianth-tube; b, ovary and stamens; e, stamen.

**Asarum infrapurpureum** HAYATA sp. nov. Rhizoma repens vel ascendens dense radicans, radicibus teretibus incrassatis  $1-1\frac{1}{2}$  mm. in diametro subrectis, apice caulescens. Caulis 1-3 cm. longus sursum foliosus, foliis 1-5 versus apicem caulis approximativè dispositis cum squamis intermixtis, squamis 2-3 ovato-oblongis 10-18 mm. longis semi-hyalinis apice acutis hirsutis reticulato-nervosis. Folia longe petiolata, petiolis incrassatis (subcomplanatis?) 3 mm. latis intus canaliculatis patenti-hirsutis 7-17 cm. longis, lamina oblongo-cordata vel triangulari-cordata ab apice petioli usque ad apicem laminae  $7\frac{1}{2}-5$  cm. longa 9-6 cm. lata apice triangulari-acuta vel breve cuspidato-acuta ad summum obtusa vel ad centrum summorum apiculata vel haud apiculata basi cordata vel auriculato-cordata, lobis cordis (a fundo sinus inter lobos cordis usque ad apicem lobi cordis)  $4\frac{1}{2}$  cm.- $2\frac{1}{2}$  cm. longis 4- $2\frac{1}{2}$  cm. latis, sinibus inter lobos cordis  $\infty$ -formibus, 5-nervia vel obscure 7-nervia, nervis lateralibus primariis arcuatis, margine integra tenuissime purpureo-marginato-venata margine dense minuteque hirsuta, nervis venis supra subimpressis, pagine subglabra supra utroque latere costae nebuliforme marmoreo-albo-maculata, subtus pallido-purpurea ad nervos venasque rufo-purpurascenti, nervis venis subtus elevatis, crassiusculo-membranacea, reticulis venularum supra haud visis subtus distincte visis purpureo-coloratis. Flores purpurascentes quasiterminales solitarii, pedicellis glabris 1 cm. longis, erecti vel subnutantes. Perianthii tubus glaber subobconicus 12 mm. longus 14 mm. latus extus glaber sublaevis intus glaber tessellato-reticulatus, reticulis elevatis purpurascentibus, ad orem annulis membranaceis singulis 2 mm. altis deorsum reflexis instructus, limbo patenti usque ad apicem lobi (i.e. in radio) 17 mm. longo extus glabro intus deorsum glabro circum orem minute annulariter ruguloso (rugulis elevatis) a supra basin usque ad apicem lobi haud ruguloso sed pilis brevissimis crispatis adpresse denseque oblecto profunde 3-lobato vel fere 3-partito, lobis triangularibus plus minus inaequalibus majoribus triangulari-semi-rotundatis 15 mm. longis totiusque latis vel latioribus apice obtusis vel triangulari-acutis vel obtusissimis basi haud vel vix contractis margine integris sed deorsum sursumque valde reflexo-repandis. Stamina 12, filamentis complanatis, cum ovarium perfecte vel fere perfecte connatis, antheris oblongis  $2\frac{1}{2}$  mm. longis plus quam 1 mm. latis, loculis 2 linearibus, connectivis apice leviter productis. Ovarium semisuperius, carpellis 6, partibus liberis 3 mm. longis latere

complanatis plus quam 1 mm. latis infra apicem dorso stigmatiferis, stigmatibus globosis lateralibus; partibus apicalibus carpellorum ultra stigmata productis  $\frac{1}{2}$  vel  $\frac{3}{4}$  mm. longis interdum 2-lobatis.

HAB. Shichiseitonzan, leg. S. SASAKI, Mart. 1907.

Nearly the same as *A. taitonense* HAYATA in the floral structure, but distinguishable from it by the auriculiformed lobes of the cordate leaves which are purpurascens on the under surface.

**Asarum leptophyllum** HAYATA sp. nov. Rhizoma repens teres 3 mm. in diametro subhirsutum reliquo basis petioli notatum sursum caulescens remote 2-3 foliatum et simul squamatum, foliis 2-3 a se circ. 1 cm. remotis, squamis 2-3 cum foliis intermixtis, squamis ovatis sessilibus apice acutis basi caulem amplectantibus intus supra subglabris subtus ad nervos crispato-ciliato-hirsutis margine dense hirsutis, pilis crispatis, partibus rhizomatis caulescentibus dense crispato-hirsutis 2-3 cm. longis apice folia duo gerentibus ad apicem florem unum gerentibus. Folia longe petiolata, petiolis 9-12 cm. longis dense crispato-hirsutis  $1\frac{1}{2}$  mm. latis, lamina cordato-oblonga circ. 10 cm. longa circ. 5 cm. lata apice triangulari-acuta basi auriculato-cordata, lobis cordis (ab apice petioli usque ad apicem lobi cordis)  $2-3\frac{1}{2}$  cm. longis  $2-3\frac{1}{2}$  cm. latis apice perfecte rotundatis vel obtuso-rotundatis, sinibus inter lobos cordis acutis vel obtusis  $\wedge$ -formibus, tenuiter membranacea margine subintegra remote minuteque in exsiccatō fuscenti in vivo fusco-viridescenti haud albo-variegata subtus pallida utraque pagine nitenti sparse hirsuta 5-nervia vel obscure 7-nervia, nervis lateralibus tenuissimis recurvo-arcuatis, reticulis venularum utroque vix vel haud visis. Flores pallido-virides quasiterminales solitarii ex axilla inter folia apicalia duo oriundi, pedicellis 1 cm. longis hirsutis, pilis longiusculis crispatis. Perianthium extus barbatum, partibus tubi cum ovario adnatis semi-rotundatis 6 mm. longis 8 mm. latis plus barbatis, partibus tubi supra ovarium exsertis 7 mm. longis 7 mm. latis ad orem plus minus constrictis extus minus barbatis intus subglabris vel pilis punctiformibus notatis, lobis perianthii limbi viridescens triangulari-lanceolatis apice caudigeris cum caudis 23 mm. longis basi latissimis vel plus minus contractis 5 mm. latis, caudis linearibus 10-13 mm. longis, margine integris extus barbatis intus dense minute botryoideo-punctatis vel brevissime pubescentibus; lobis perianthii jam anthesin patentibus post

anthesin erectis semiclausis. Stamina 12 supra ovarium sita et eo affixa, filamentis a basi styli liberis, partibus liberis  $1\frac{1}{2}$  mm. longis complanatis glabris, antheris linearibus 1 mm. longis, connectivis apice valde productis, partibus productis  $\frac{1}{2}$ – $\frac{1}{4}$  mm. longis. Ovarium viride fere inferius, partibus ovarii cum tubi perianthii adnatis 5 mm. longis, partibus liberis superioribus cum stylo 4 mm. longis, stylo valido erecto columniformi 2 mm. longo 1 mm. lato profunde 6-sulcato glabro apice 6-lobato, lobis brevissime patentibus apice ad latus exterius stigmatosis.

HAB. Arisan, Mart. 1914, leg. B. HAYATA et T. ITÔ.

Near *Asarum caudigerum* HANCE, Bot. Mag. t. 7126; but distinguishable from it by the light greenish flowers; in *S. caudigerum*, the lobes of the perianth are reddish inside.

**Asarum leptophyllum** HAYATA var. **triangulare** HAYATA n. v. Folia lamina triangularis 6–7 cm. longa 8 cm. lata apice triangulari-acuta basi latissime cordata (vel tenuissime hastata), lobis cordis apice rotundatis, herbaceo-membranacea utraque pagine rufo-hirsuta 7–5-nervia, nervis subrectis vel arcuatis. Flores apertientes non visi. Bacca depresso-globosa 13 mm. longa 15 mm. lata apice lobis perianthii persistentibus coronata. Semina  $\infty$  nitido-nigra nitida 4 mm. longa  $2\frac{1}{2}$  mm. lata in ambitu ovata apice obtusa basi rotundato-truncata dorso valde convexa facie valde concava utroque latere basi valde interiore recurva arillos amplexantia, arillis membranaceis irregulariter multo plicatis nigricantibus, testa coriacea; albumen copiosum, embryo minutus ad apicem albuminis situs.

HAB. Arisan: Eunkiko, leg. T. Itô et B. HAYATA, Mart. 1914.

Differs from the type by the nearly triangular leaves.

**Asarum taitonense** HAYATA sp. nov. Rhizoma repens. Folia solitaria, petiolis 8–9 cm. longis crispato-hirsutis, lamina  $4\frac{1}{2}$  cm. longa totiusque lata profunde cordata, lobis cordis plus minus divaricatis, sinibus cordis  $\infty$ -formibus, margine integra prope et ad marginem dense ciliolata supra viridissima inter medium et marginem albo-marmoreo-maculata ad nervos tenuissime hirsuta subtus pallidissima palmato-pedatim 7-nervia ad nervos hirsuta apice triangulari-obtusa ad summum minute mucronata membranacea plus minus crassiuscula. Flores e basi petioli oriundi solitarii, pedicellis 7 mm. longis nutantibus

brevissime hirsutis. Perianthii tubus obconico-inflatus 12 mm. longus 14 mm. latus ad orem plus minus contractus vel haud contractus basi truncatus extus glaber intus glaber tessellato-reticulatus, reticulis valde elevatis atropurpureis, ad orem appendicibus annuliformibus deorsum reflexis  $1\frac{1}{2}$  mm. longis instructus, limbo patenti 3-lobato, lobis late triangularibus 8 mm. longis 12 mm. latis apice triangulari-obtusis basi plus minus contractis extus glabris intus hirsutis basi circum orem  $\infty$ -seriatim verrucosis, verrucis annulariter dispositis 1 mm. longis 2 mm. latis atro-purpureis. Stamina 12 cum ovario affixa sub basi styli oriunda, antheris sessilibus oblongo-sessilibus 2 mm. longis  $\frac{2}{3}$  mm. latis, connectivis apice productis, partibus productis  $\frac{1}{3}$ - $\frac{1}{2}$  mm. longis obtusissimis. Ovarium fere superius cum stylo 6 mm. longum, partibus liberis carpellorum (i. e. stylis) 6 erectis 3 mm. longis glabris latere compressis 1 mm. latis, stigmatibus lateralibus oblongis ad latus apicis stylorum sitis 1 mm. longis, partibus stylorum supra stigmata productis linearibus  $\frac{2}{3}$ -1 mm. longis circ. 2-partibus.

HAB. Mt. Taiton, leg. U. FAURIE, Juni. 1903.

Near *Asarum macranthum* Hook f., but differs from it by the smaller flowers with far less warts around the mouth of the perianth-tube, and in the stigmata locating on the back of the styles.

**Asarum macranthum** Hook f.; MATSUM. et HAYATA Enum. Pl. Formos. p. 343; Bot. Mag. t. 7022.

HAB. Sansaho, leg. Y. SHIMADA.

Rhizoma ascendens repens. Folia in specimine nostro solitaria, petiolis 7-8 cm. longis crispato-hirsutis, lamina cordato-oblonga vel cordato-triangulari, ab apice petioli usque ad apicem laminae 5-6 cm. longa  $4\frac{1}{2}$ -7 cm. lata apice triangulari-obtusa basi profunde cordata, sinibus cordis  $\Omega$ -formibus, lobis cordis  $1\frac{1}{2}$ -3 cm. longis 2-3 $\frac{1}{2}$  cm. latis se imbricatis vel haud imbricatis, margine integra ad marginem minute ciliolata supra viridissima sed inter medium et marginem albo-marmoreo-maculata glabra, nervis venis elevatis tenuissimis, subtus pallidissima, nervis valde elevatis, palmato-pedatim 7-nervia, nervis pubescentibus, crassiuscula. Flores e basi petioli oriundi solitarii, pedicellis 1 cm. longis vel longioribus breve hirsutis. Perianthii tubi obconico-inflati 13 mm. longi 15 mm. lati ad orem plus minus contracti basi obconico-truncati extus glabri supra basin usque ad orem atro-purpurei intus glabri tessellato-reticulati,

reticulis valde elevatis atro-purpureis, ad orem intus appendicibus membranaceis atropurpureis annuliformibus deorsum reflexis 3 mm. longis instructi, limbo basi suberecto supra basin patenti 3-lobato, lobis extus glaberrimis intus supra hirsutis rotundato-triangularibus  $1\frac{1}{2}$  cm. longis 17 mm. latis partibus basilaribus haud verrucosis apice triangulari-acutis basi plus minus contractis margine integris sed deorsum sursumque undulatissimis repandissimis basi circum orem  $\infty$ -seriatim annulariter verrucosis, verrucis dorso compressis membranaceis 2 mm. longis 3 mm. latis semi-rotundatis atro-purpureis. Stamina 12 cum ovario connata, infra basin styli oriunda, antheris sessilibus oblongo-linearibus  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis, connectivis apice productis, partibus productis triangularibus  $\frac{2}{3}$  mm. longis. Ovarium semi-superius 3 mm. longum, stylo 6-partito, partibus erectis latere valde compressis 3 mm. longis 1 mm. latis apice oblique inaequaliter 2-lobatis, lobis exterioribus longioribus apice dorso stigmatosis, partibus stigmatosis exteriore recurvis unciniformibus, lobis interioribus non stigmatiferis brevissimis rectis leviter 2-lobulatis, lobulis obtusis.

### Laurineæ.

#### *Beilschmiedia* NEES.

**Beilschmiedia Tanakæ** HAYATA sp. nov. (Fig. 53-A-b). Arbor, ramuli teretes graciles 2-3 mm. in diametro fuscentes subglabri. Gemma foliifera ovoidea apice acuta. Folia membranacco-chartacea in exsiccatto fuscentia utraque glaberrima oblongo elliptica vel oblongo-ovata 10 cm. longa  $4\frac{1}{2}$  cm. lata apice acuta, acumine obtuso, basi obtusa aliquando rotundata sed ad extremitatem breve decurrentia, costis venis venulis utraque pagine distincte prominenteque elevatis, venis lateralibus utroque latere costæ 11-12, mediis a costa angulo  $50^\circ$  egressis, prominente venulato-reticulatis, reticulis venularum rubescentibus circ.  $1-\frac{2}{3}$  mm. in diametro, tenuiter cartilagineo-marginata, petiolis 6 mm. longis glabris intus profunde canaliculatis subalatis.

HAB. Liukiu; Yäyama: Mt. Urabu, leg. S. TANAKA, 1887, Juni. (spec. steril.).

Near *Beilschmiedia erythrophloia* HAYATA, but quite different from it in having much thinner chartaceous leaves with more distinctly elevated reticulation on both sides.

**Beilschmiedia erythrophloia** HAYATA (Fig. 53-A-a) Ic. Pl. Formos. IV.

p. 20.

*Cryptocarya*

R. BR.

*Cryptocarya Ko-**nishii* HAYATA Mater.

Fl. Formos. p. 237; Ic.

Pl. Formos. III. p. 157.

Descriptio auctata:—

Cymæ ad folia superiora axillares vel terminales longe pedunculatæ, pedunculis gracilibus erectis  $1\frac{1}{2}$  cm. longis cum cymis pubescentibus; cymis (pedunculis exceptis)  $1\frac{1}{2}$  cm. longis totiusque vel minus latis dense ramosis dense floratis totis pubescentibus, pedicellis ultimis brevissimis 1 mm. longis vel longioribus vel brevioribus, bracteis minutis

dense pubescentibus triangulari-ovatis ciliatis  $\frac{1}{2}$  mm. longis basi haud contractis apice acutis vel obtusis. Calyx extus dense brevique pubescens cum tubo tubuloso-campanulatus  $3-3\frac{1}{2}$  mm. longus, tubo intus glaberrimo 1 mm. longo cylindrico vel subureolato vel tubuloso-obconico sub ore leviter constricto vel haud constricto, limbo plus minus patenti 6-lobato, lobis oblongis  $2\frac{1}{4}$  mm. longis  $1\frac{1}{3}$  mm. latis apice obtusis basi leviter contractis extus plus intus minus pubescentibus. Stamina ordinis I. ad basin lorum affixa cum filamentis 2 mm. longa, filamentis valde complanatis 1 mm. longis  $\frac{1}{4}$  mm. latis hirsutissimis apice plus minus dilatatis ad antheram abeuntibus, antheris oblongis complanatis cum

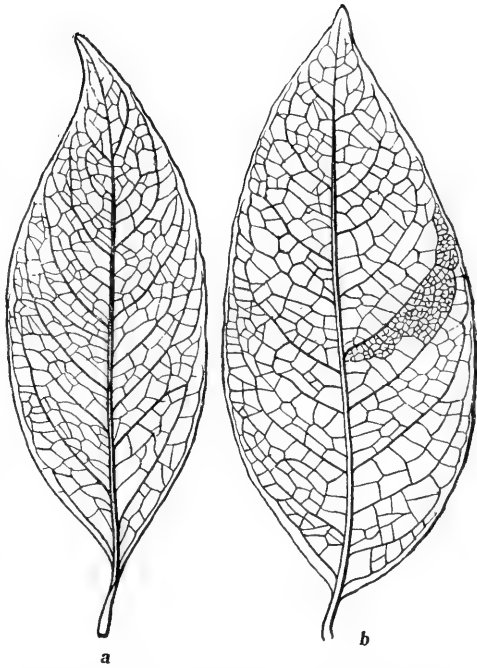


Fig. 53-A; a, *Beilschmiedia erythrophloia* HAYATA; b, *Beilschmiedia Tanakæ* HAYATA.

appendice connectivi minus quam 1 mm. longis minus quam  $\frac{1}{2}$  mm. latis, apice appendice connectivi terminatis, appendicibus rotundato-acutis apice introrse incurvis apiculatis  $\frac{1}{4}$  mm. longis totiusque latis membranaceis, introrsum 2-locellatis basi ad filamenta abeuntibus utraque pagine glabris; stamina ordinis II. cum eis ordinis I. conformia; stamina ordinis III. cum eis ordinis I. conformia, sed filamentis minus complanatis, antheris extrorse 2-locellatis appendicibus connectivorum eis staminum ordinis I. et II. plus minus longioribus introrse reflexis, filamentis ad basin utroque latere glandulis auctis, glandulis stipitatis cum stipitibus 1 mm. longis hirsutis oblongis, stipitibus  $\frac{1}{2}$ - $\frac{3}{4}$  mm. longis; stamina ordinis IV. eglandulosa subsessilia oblongo-sagittiformia  $1\frac{1}{4}$  mm. longa  $\frac{1}{4}$  mm. lata apice acuminata basi subcordato-obtusa extus medio valde carinata ad carinas hirsuta intus medio late canaliculata apice tenuiter membranacea haud recurva glabra. Ovarium in fundo calycis tubi situm cylindricum  $\frac{3}{4}$ -1 mm. longum calycis tubo toto inclusum glaberrimum apice ad stylum abeuns, stylo glaberrimo apice haud dilatato oblique truncato stigmatoso, stigmate medio 1-sulcato.

HAB. Uraisha; Juli. 1912, leg. B. HAYATA et S. SASAKI, (fl.).

*Cinnamomum* BURMAN.

***Cinnamomum acuminatifolium*** HAYATA, sp. nov. (Fig. 53-B-a). Arbor, rami fuscentes glabri. Gemma ut videtur parva ovoidea acuta 3 mm. longa subglabra. Folia coriacea oblongo-lanceolata lanceolata vel oblonga  $9\frac{1}{2}$  cm. longa 3 cm. lata apice acuminatissima ad summum obtusa basi cuneato-acuta margine integra 3-nervia, nervis lateralibus a basi sursum in 7 mm. altitudine e nervo centrali oriundis ascendentibus cum nervo centrali subparallelis, nervis supra vix vel haud elevatis subtus elevatis, venulis inter nervos subtransversis supra haud elevatis subtus tenuissime elevatis, pagine supra plana subtus subglaucescentia utraque glabra, petiolis 12 mm. longis glabris subteretibus intus tenuiter sulcatis extus convexis. Cymæ floris non visæ; cymæ fructifere axillares haud terminales circ. 5 cm. longæ a basi ramosæ haud pedunculatæ, pedicellis ultimis 1 cm. longis glabris. Cupula campanulata 4 mm. longa 4 mm. lata glabra rugosa irregulariter 6-dentata, dentibus 2 mm. latis  $\frac{1}{2}$  mm. longis. Drupa ovoidea basi obtusa apice acuta ad summum obtusa 1 cm. longa 6 mm. lata lævis apice fusco-colorata.

HAB. Shinkō: Mt. Aioku, leg. A. HINO, (No. 5782) Dec. 1905.



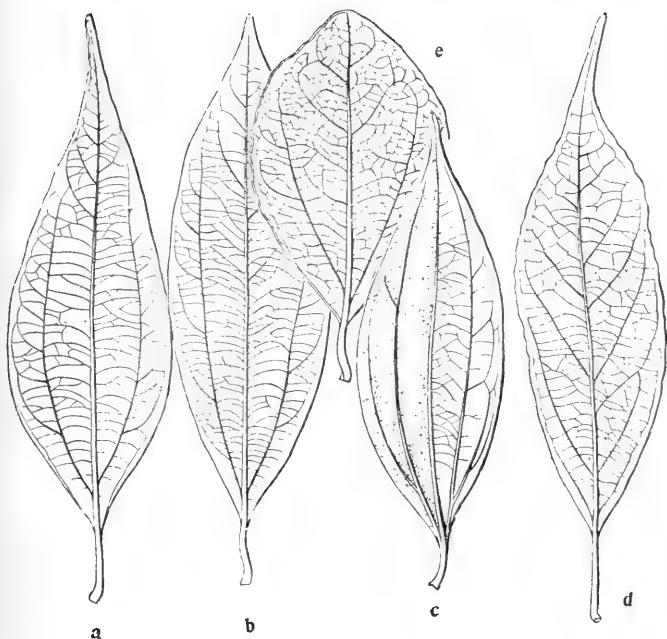


Fig. 53-B; a, *Cinnamomum acuminatifolium* HAYATA; b, *Cinnamomum macrostemon* HAYATA; c, *Cinnamomum randaiense* HAYATA; d, *Cinnamomum acuminatissimum* HAYATA; e, *Cinnamomum reticulatum* HAYATA.

Near *Cinnamomum pedunculatum*, but differs from it by the caudate leaves with cuneate base.

***Cinnamomum acuminatissimum*** HAYATA (Fig. 53-B-d) Ic. Pl. Formos. III. p. 157.

***Cinnamomum bartheifolium*** HAYATA sp. nov. (Fig. 54-h). Arbor, ramuli subtetragoni recti haud flexuosi subglabri in exsiccato fusco-purpurascens leves haud lenticellati in juvenescenti tenuiter adpresse pubescentes demum subglabri, foliis et ramulis suboppositis vel alternis. Gemma foliifera sericeo-pubescent minor, perulis oblongis vel rhomboideis acutis dorso sericeo-puberulis. Folia

coriacea oblonga vel lanceolato-oblonga 6 cm. longa 18 mm. lata apice acuminata, acumine acuto- vel cuspidato-acuto, basi obtusa vel obtusissima supra nitida glabra subtus breve pubescentia subalbo-fulvescentia sub lente minute papillosa, costis supra tenuiter impressis subtus distincte elevatis rubro-coloratis, venis venulis supra haud visis subtus vix vel haud elevatis, pagine supra in exsiccate fulvescentia margine cartilaginea desuper subrecurva 3-costata, costis lateralibus e ima basi oriundis ad 3-4 mm. altitudinem conjugatis basi a costa centrali angulo  $40^\circ$  egressis basi arcuatis a medio sursum costa centrali parallelis a costa 6 mm. a margine 4 mm. distantibus sursum infra acumen evanescentibus, costa centrali recta ad apicem ipsum attingenti, venis costae centralis nullis, venis costis lateralibus extrorsum 2-4 prope marginem cum eis superioribus junctis tenuissimis supra haud subtus vix visis, venis transversis horizontaliter dispositis leviter  $\sim$ -formiter curvatis vel subrectis, petiolis 4 mm. longis fusconigricantibus intus canaliculatis glabris. Flores paniculato-cymosi, cymis axillaribus cum pedunculis 5-7 cm. longis  $1\frac{1}{2}$  cm. latis, pedunculis 2-4 cm. longis plus minus complanatis, pedicellis ultimis 3 mm. longis, pedunculis cum rhachibus pedicellisque leviter pubescentibus, bracteis caducissimis ignotis. Calycis tubus extus pubescens intus sparse hirsutus 1 mm. longus plus latus, limbo 6-fido, segmentis subaequalibus oblongis  $2\frac{1}{2}$  mm. longis  $1\frac{3}{4}$  mm. latis apice acuto-obtusis basi plus minus contractis 5-nerviis utraque pagine pubescentibus margine integris. Stamina perfecta 9, ea ordinis I. et II. eglandulosa, filamentis  $\frac{1}{2}$ - $\frac{2}{3}$  mm. longis complanatis barbatis, antheris oblongis quam filamentis longioribus  $\frac{2}{3}$  mm. latis 1 mm. longis introrse 4-locellatis apice connectivis leviter productis utraque facie medio hirsutis caeterum glabris; stamina ordinis III. glandulosa, glandulis antheriformibus  $\frac{1}{3}$  mm. longis ad filamentum supra basin filamentorum adnatis sessilibus glabris, antheris extrorsis 4-locellatis; staminodia ordinis IV. 1 mm. longa basi filamentiformia apice antheriformia, partibus filamentiformibus complanatis  $\frac{1}{2}$  mm. longis utraque facie hirsutis, partibus antheriformibus ovato-oblongis apice acutis  $\frac{1}{2}$  mm. longis intus glabris extus hirsutis. Ovarium ellipsoideum 1 mm. longum 1-ovulatum, stylo circ.  $1\frac{1}{2}$  mm. longo glabro.

HAB. Nantō: Mt. Randaisan, leg. U. MORI, Juli. 1907, (No. 3295) (fl.).

Near *Cinnamomum Döderleinii* ENGL., but separable from it by the more regularly horizontally arranged veinlets of the costae.

**Cinnamomum caudatifolium** HAYATA sp. nov. (Fig. 54-1b). Arbor, ramuli annotini haud lenticellati fuscentes subglabri, ramuli hornotini fulvo-pubescentes subangulato-teretes gracillimi  $1\frac{1}{2}$  mm. in diametro. Folia per totum ramulum remote sita chartaceo-coriacea oblonga vel ovato-oblonga vel obovato-oblonga rarius lanceolata  $6\frac{1}{2}$ -9 cm. longa  $2\frac{1}{2}$  cm. lata apice subito acuminata vel caudato-acuminata (acuminibus plus minus recurvis) basi cuneata vel cuneato-attenuata margine integra plus minus undulata, costa supra basi tenuiter sulcata supra haud sulcata haud vel vix elevata, venis supra tenuissime elevatis vel haud elevatis subtus vix vel tenuissime sed distincto elevatis, pagine supra glabra (in vivo) submitida subtus primum tenuiter sericeo-fulvo-pubescentia sed demum glabrata plus minus glauca, venis lateralibus primariis utroque latere costae 3-7, mediis a costa angulo  $40^{\circ}$ - $45^{\circ}$  egressis, petiolis gracilibus 13 mm. longis tenuiter pubescentibus vel subglabris intus late sulcatis extus convexis. Flores cymoso-paniculati, paniculis terminalibus sessilibus 6-7 cm. longis 3-4 cm. latis; rhachis panicularum  $1-2\frac{1}{2}$  cm. longa, ramis ordinis I. 3-10 alternis rectis patentissimis 3-5 cm. longis apice flores cymosim gerentibus, pedicellis ultimis 4 mm. longis, bracteis caducissimis ignotis; rhachis cum ramis pedicellisque fulvo-pubescentibus. Calycis tubus campanulatus  $1\frac{1}{2}$  mm. longus apice totiusque latus extus cum segmentis pubescens intus dense barbatus, segmentis 6 subaequalibus oblongis vel oblongo-linearibus 3 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusis basi haud vel vix contractis patentibus intus plus minus concavis apice obtusis utraque pagine pubescentibus 5-nerviis margine integris. Stamina ad basin segmenti affixa, ea ordinis I. et II. eglandulosa, filamentis  $1\frac{1}{3}$  mm. longis complanatis basi hirsutis supra basin sursum glabris, antheris ovato-oblongis  $\frac{3}{4}$  mm. longis  $\frac{1}{2}$  mm. latis apice obtusissimis introrsum 4-locellatis; ordinis III. basi utroque latere glandulis aucta, glandulis antheriformibus  $\frac{1}{2}$  mm. longis oblongis stipitatis, stipitibus  $\frac{1}{4}$  mm. longis cum filamentis plus minus connatis dense barbatis; staminodia sagittiformia  $\frac{1}{2}$  mm. longa, stipitibus  $\frac{1}{2}$  mm. longis dense barbatis. Ovarium glabrum vel sparse barbatum obovoideum vel ovoideum 1 mm. longum  $\frac{3}{4}$  mm. latum, stylo  $1\frac{1}{2}$  mm. longo glabro apice plus minus dilatato interdum plus minus recurvo.

HAB. Mt. Arisan: intre Karapin et Funkiko, prope Suisharyō, leg. B.

HAYATA, Mart. 1914.

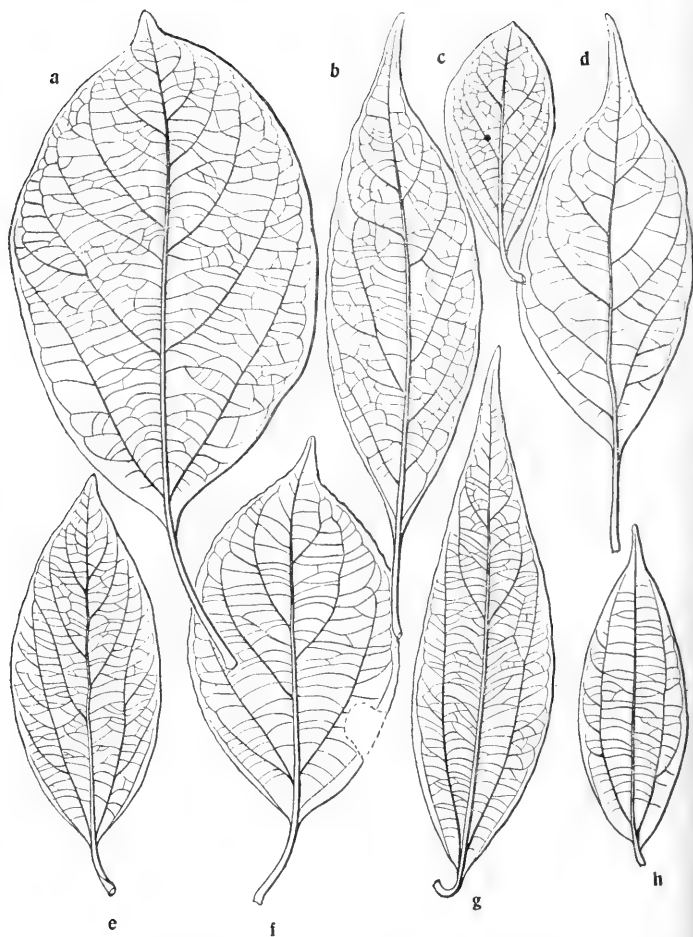


Fig. 54; a, *Cinnamomum micranthum* HAYATA; b, *Cinnamomum caudatifolium* HAYATA; c, *Cinnamomum obovatifolium* HAYATA; d and f, *Cinnamomum Kanakirai* HAYATA; e, *Cinnamomum insulari-montanum* HAYATA; g, *Cinnamomum pseudo-Loureirii* HAYATA; h, *Cinnamomum bartheifolium* HAYATA.

Near *Cinnamomum acuminatissimum* HAY., but distinguishable from it by the thinner leaves and a little larger flower. The buds of the shoots were, in this season of the year, very small, and therefore, are not available for description. Found standing solitary on the bank of a valley near Suisharyō.

**Cinnamomum insulari-montanum** HAYATA (Fig. 54-e). Ic. Pl. Formos. III. p. 158.

**Cinnamomum Kanahirai** HAYATA (Fig. 54, d and f). Ic. Pl. Formos. III. p. 159. Descriptio auctata: Gemma foliifera globosa obtusissima, perulis subrotundatis dorso fulvo-sericeo-pubescentibus ad marginem subglabratis ciliolatis. Cymæ terminales 2-3 mm. longæ totiusque latæ in alabastro perulis perfecte involutæ, perulis interioribus spathulatis variabilissimis dorso sericeo-pubescentibus intus glabris apice rotundatis, bracteis caducissimis linearibus 4 mm. longis  $\frac{1}{3}$  mm. latis apice acuminatis dorso sparse pubescentibus, pedicellis ultimis 2 mm. longis teretibus glabris. Calyx campanulatus glaber, tubo extus glabro intus piloso 1 mm. alto  $2\frac{1}{2}$  mm. vel 3 mm. in diametro obconico, lobis 6 subæqualibus quadrangulati-oblongis 2 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusissimis extus glabris intus densissime fulvo-pilosis, nervis 3 obscure visis. Cupula calycis late obconica 1 mm. alta ad orem 2 mm. in diametro intus densissime longeque pilosa. Stamina ordinis I. eglandulosa, filamentis latissimis  $\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis sparse pilosis vel subglabris, antheris late rotundatis  $\frac{1}{3}$  mm. longis  $\frac{2}{3}$  mm. latis latioribus quam longioribus apice rotundato-emarginatis glabris valde complanatis introrse 4-locellatis; stamina ordinis II. eglandulosa cum eis ordinis I. conformia; stamina ordinis III. eis ordinis I. conformia, sed antheris extrorse 4-locellatis, filamentis utraque facie densissime pilosis utroque latere glandula auctis, glandulis sessilibus late cordato-reniformibus valde complanatis apice late acutis vel obtusis basi profunde cordatis  $\frac{1}{2}$  mm. latis latioribus quam longioribus; stamina ordinis IV. abortiva, filamentis densissime longeque pilosis  $\frac{1}{2}$  mm. longis  $\frac{1}{4}$  mm. latis, antheris abortivis sagitti-formibus  $\frac{2}{3}$  mm. longis apice acutis basi cordatis. Ovarium globoso-ovoideum minus quam 1 mm. longum totiusque latum glabrum, stylo columnari 1 mm. longo glabro, stigmate dilatato plus minus obliquo subpeltato  $\frac{2}{3}$  mm. in diametro medio subimpresso-sulcato dense pectinato-cristato.

HAB. Shintiku, Nanshō: Kalizenzan, leg. R. KANEHIRA, Oct. 1914, (fl.).

**Cinnamomum macrostemon** HAYATA (Fig. 53-B-b). Ic. Pl. Formos. III. p. 160.

**Cinnamomum micranthum** HAYATA (Fig. 54, a and fig. 55.). Ic. Pl. Formos. III. p. 160. Descriptio auctata: Gemma foliifera globosa apice obtusa vel subacuta, perulis subrotundatis dorso sericeo- vel ferrugineo-pubescentibus ad marginem glabratis tenuiter ciliatis in magnitudine variabilibus. Lobi perianthii decidui. Pedicelli fructiferi 5 mm. longi; calycis tubus valde accrescens late campanulato-patelliformis 6 mm. altus 7 mm. in diametro ore plus minus contractus utraque facie glaber. Glans obovato-ellipsoidea 15 mm. longa 11 mm. lata apice basique truncata apice ad centrum umbonata, umbonibus planis 3 mm. in diametro, basi obtuso-truncata ad centrum cicatricibus depressis  $2\frac{1}{2}$  mm. in diametro notata facie nitida.

HAB. Formosa: loco non indicato, leg. S. NAKAI, Aug. 1914.

**Cinnamomum obovatifolium** HAYATA (Fig. 54-c). Ic. Pl. Formos. III. p. 161.

**Cinnamomum pseudo-Loureirii** HAYATA (Fig. 54-g). Ic. Pl. Formos. IV. p. 20. Descriptio auctata: Arbor; ramuli annotini et hornotini graciles teretes glabri fulvescentes sublaeves. Gemma globosa apice obtusa haud acuta 2 mm. longa, perulis glabris margine ciliatis. Folia chartaceo-coriacea vel tenuiter coriacea lanceolata vel ovato-lanceolata 9 cm. longa  $2\frac{1}{2}$  cm. lata apice gradatim acuminata vel rarius plus minus caudato-acuminata ad summum acuta vel obtusa basi cuneato-acuta margine integra 3-nervia margine haud cartilaginea vix vel haud reflexa; costae prominentes 3 ex ima basi ortae ad 7 mm. conjugatae et ibi non semper eodem loco divergentes, additis aliquando 2-gracilibus juxta margines, media in acumen ipsum extensa, 2-laterales basi leviter arcuatae infra acumen evanescentes; venis costarum lateralium extrorsum aliquando 3-4 aliquando 5-10 curvatis aliquando cum costulis marginalibus junctis; nervulis transversis multis —formiter curvatis; costae utraque pagine

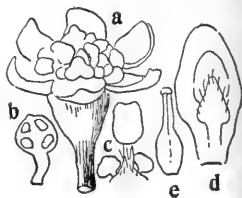


Fig. 55, *Cinnamomum micranthum* HAYATA; a, a flower; b, a stamen without glands; c, another stamen with glands; d, a perianth-lobe with a stamen and staminode; e, ovary.

elevatæ, venulis supra obscure subtus distincte elevatis utraque glabris, petiolis 6-7 mm. longis glabris intus canaliculatis.

HAB. Tōyēn : Taiyakan, leg. I. TANAKA et S. NAKAI, Oct. 1913, (fr.).

**Cinnamomum randaiense** HAYATA (Fig. 53-B-c). Mater. Fl. Formos.  
p. 238.

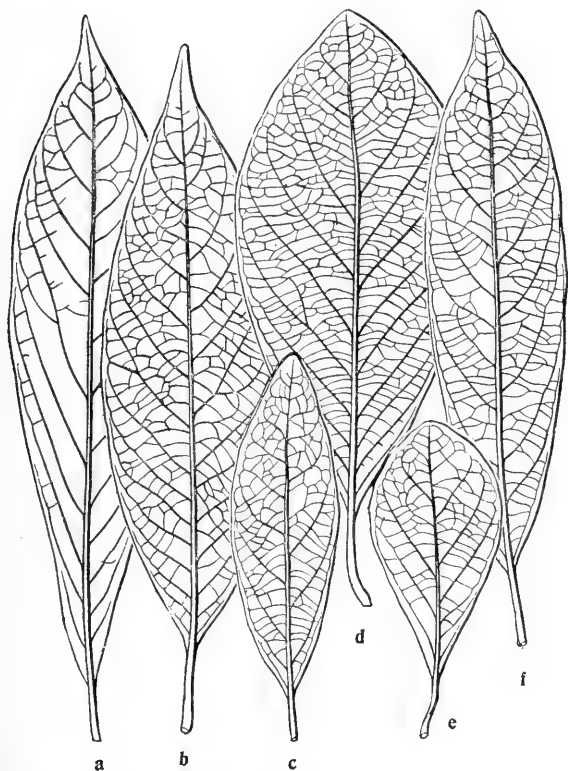


Fig. 53; a, *Machilus pseudolongifolia* HAYATA; b, *Machilus arisanensis* HAYATA; c, *Machilus zuihoensis* HAYATA; d, *Machilus kwashotensis* HAYATA; e, *Machilus suffrutescens* HAYATA; f, *Machilus longisepala* HAYATA.

**Cinnamomum reticulatum** HAYATA (Fig. 53-c). Mater. Fl. Formos. p. 239.

*Machilus* NEES.

**Machilus arisanensis** HAYATA n. n. (Fig. 56-b and fig. 57).

*Machilus macrophylla* HEMSLEY var. *arisanensis* HAYATA Mater. Fl. Formos. p. 243.

**Machilus kwashotensis** HAYATA sp. nov. (Fig. 56-d). Arbruscula; ramuli fusco-purpurascens tenuiter longitudinaliter rugulosi parce lenticellati, lenticellis plus minus elevatis longitudinaliter oblongis rubescentibus 1 mm. longis, ramulis ultimis haud lenticellatis. Folia tenuiter coriacea obovata obovato-oblonga vel obovato-lanceolata 7-8½ cm. longa 2½-4½ cm. lata apice breve cuspidato-obtusa ad summum obtusa basi cuneata margine haud vel vix recurva pagine supra glabra in exsiccatō fulvo-rubescens subtus glabra glaucescentia, costa supra tenuiter impressa subtus plano-elevata, venis venulisque tenuissime supra minus subtus plus elevatis, venis lateralibus primariis utroque latere costae 10-12 subtus distinctis, mediis a costa angulo 45° egressis haud flexuosis plus minus arcuatis, petiolis 1½-2½ cm. longis plano-convexis in sectione intus sursum late canaliculatis subalatis, canaliculis deorsum angustissimis ad nullum reductis. Flores non visi. Paniculae fructiferae ad folia superiora axillares, pedunculis complanatis glabris circ. 5 cm. longis, pedicellis 1 cm. longis, segmentis calycis reflexis 2-3 mm. longis. Bacca depresso-globosa latior quam longior 1 cm. longa plus quam 1 cm. lata apice leviter depressa vel subplana basi sessilis, cicatricibus pedicellorum 1½ mm. in diametro.

HAB. Kwashōtō, leg. G. NAKAHARA, Feb. 1906, (No. 1039).

Near *Machilus Faberi* HEMSLEY, but distinguishable from it by the obovate obtuse leaves.

**Machilus longisepala** HAYATA (Fig. 56-f). Ic. Pl. Formos. p. 162.

**Machilus pseudolongifolia** HAYATA sp. nov. (Fig. 56-a). Arbor. Rami fulvo-cinerascentes glabri, cortice sub lente longitudinaliter fissō remote lenticellato, lenticellis valde elevatis rotundatis vel longitudinaliter elongatis 1 mm. in diametro demum subbipartitis rubescentibus. Gemma foliifera ovoidea apice obtusa vel subacuta in nostro specimine circ. 1 cm. longa 6 mm. lata multiseriatim perulata, perulis dorso sericeo-pubescentibus ad marginem glabris castaneo-



coloratis dense castaneo-ciliolatis. Folia chartacea vel chartaceo-coriacea lineari-oblongata vel oblongo-oblongata 5-12 cm. longa 14-26 mm. lata apice cuspidato-acuminata basi gradatim angustata ima basi obtusa ad extremitatem acuta, costa supra impressa subtus complanato-elevata, venis supra subtusque tenuissime visis planis haud impressis haud elevatis gracillimis, venulis haud visis, venis primariis lateralibus utroque latere circ. 10-12, mediis a costa angulo 50° egressis, margine integerrima haud recurva pagine supra glaberrima in exsiccatto flavo-fulvescentia subtus purpureo-rubescencia glabra subglaucescentia, petiolis 5-15 mm. longis glabris intus canaliculatis in exsiccatto fuscentibus. Paniculae ad folia superiora axillares cum pedunculis 8-10 cm. longae pauci-floratae, pedunculis 4-5 cm. longis glabris complanatis, pedicellis ultimis circ. 1 cm. longis apice haud dilatatis ad calycem haud abeuntibus glabris. Calyx cum segmentis 6-7 mm. longus extus glaber intus densissime hirsutus fere 6-fidus, segmentis lineari-oblongis 5 mm. longis  $2\frac{1}{3}$  mm. latis apice obtusissimis basi haud contractis circ. 10—nerviis, nervis parallelis, intus fere glabris sed prope apice hirsutis et ad basin strigoso-hirsutis margine integris extus glabris sursum tenuissime pubescentibus vel subglabris. Stamina ordinis I. et II. eglandulosa, filamentis linearibus complanatis  $2\frac{1}{2}$  mm. longis glabris ad basin hirsutis, antheris lineari-oblongis  $1\frac{1}{3}$ — $1\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice obtusis glabris introrsum 4-locellatis; ordinis III. filamentis basi plus minus dilatatis plus hirsutis utroque latere glandulis stipitiformibus 1 mm. longis auctis, antheris extrorsum 4-locellatis; stamina ordinis IV. abortiva (staminodia) linearia  $1\frac{1}{2}$  mm. longa  $\frac{1}{3}$  mm. lata apice triangulari-acuta complanata extus intusque hirsuta apice glabra. Ovarium glabrum obovoideum vel globosum 2 mm. longum minus quam 2 mm. latum apice apiculato-contractum cum stylo articulatam basi truncatum 1 mm. latum, stylo filiformi 2- $2\frac{1}{2}$  mm. longo glabro, stigmate leviter 2-lobato. Fructus perfecte globosus 8-9 mm. in diametro, pedicellis incrassatis 7 mm.

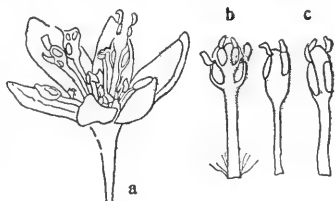


FIG. 57. *Machilus arisanensis* HAYATA; a, a flower; b, a stamen of the outer series; c, a stamen of the inner series, one is seen from within, the other from without, two inferior cells are extrorse, while the other superior introrse.

longis 2-2½ mm. latis glabris.

HAB. Arisan, Taroyen et Heishana, Aprili. 1914, leg. R. KANEHIRA, T. TANAKA et B. HAYATA, (fl. typ.); Arian, leg. T. UYEMATSU, Oct. 1912 (Gemma typ. No. 108); Nantō: Jiririsha, leg. U. MORI, Juli. 1907, (No. 3302. fr. typ.).

Near *Machilus longifolia* BLUME, but differs from it by the oblanceolate leaves which are broadest in the upper portions.

***Machilus suffrutescens*** HAYATA sp. nov. (Fig. 56-c). Suffrutex, densiuscule ramosus, ramulis fulvo-cinerascentibus valde irregulariter tuberculato-rugosis hac atque illac minute lenticellatis, lenticellis valde elevatis. Folia obovata obovato-oblonga tenuiter coriacea apice subrotundata triangulari-obtusa vel cuspidato-obtusa ad summum semper obtusissima basi triangulari-acuta vel -cuneata 4-6 cm. longa 21-24 mm. lata pagine supra in exsiccatō fulvo-rubescētia minute reticulata glabra subtus tenuissime glaucescētia rubescētia glabra, costa supra plana tenuiter obscureque sulcata subtus leviter elevata, venis venulisque tenuissimis supra minus elevatis subtus plus elevatis, venulis utraque pagine minute distincte reticulatis, areolis reticulorum utraque pagine impressis, venis lateralibus primariis utroque latere costae circ. 6, mediis a costa angulo 50° egressis haud flexuosis, petiolis glabris complanatis 5-8 mm. longis intus planis extus convexis intus vix vel haud canaliculatis fuscentibus sursum subalatis. Flores non visi. Paniculae fructiferae terminales in abortu 1-fructiferae cum pedicellis 1 cm. longae glabrae. Bacca globosa circ. 1 cm. in diametro in exsiccatō laevis nigricans, calycis lobis persistentibus plus minus deflexis.

HAB. Kōshūn: Botanrosha, leg. G. NAKAHARA, Dec. 1906, (No. 917 typ. ! et No. 926).

Near *Machilus Kwashotensis* HAYATA, but separable from it by the much smaller leaves. The new species is a shrub scrabbling on the rocks at South Cape.

***Machilus zuihōensis*** HAYATA (Fig. 56-c). Mater. Fl. Formos. p. 244.

*Phoebe* NEES.

***Phoebe formosana*** HAYATA n. n.

*Machilus formosana* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 350.

As the calyx-segments are quite erect and persistent, it should properly be

referred to *Phæbe*.

***Nothophæbe* BLUME.**

***Nothophæbe Konishii* HAYATA** (Fig. 59-c) Ic. Pl. Formos. III. p. 164.

***Litsea* LAM.**

***Litsea acutivena* HAYATA** sp. nov. (Fig. 58-d). Arbor; ramuli in exsiccato fulvo-rubescens subteretes vel angulati inter angulos subcanaliculati, ultimis fulvo-pubescentibus demum subglabris, lenticellis rotundatis minus  $\frac{1}{2}$  mm. in diametro prominente elevatis. Gemma foliifera subglobosa apice rotundata, perulis rotundatis vel semi-rotundatis dorso sericeis versus marginem glabris ad marginem castaneo-coloratis. Folia tenuiter coriacea lanceolata oblanceolata vel oblongo-lanceolata 12 cm. longa  $3\frac{1}{2}$  cm. lata apice breve acuta vel breve acuminata (acumine obtuso) basi cuneato-acuta ad extremitatem ad petiolum abeuntia margine integra subcartilaginea pagine supra glabra subtus brevissime hirsuta, costa supra impressa tenuiter subcanaliculata subtus prominente elevata, venis venulis supra tenuiter elevatis gracillimis subtus distincte elevatis distinctis, venis lateralibus primariis utroque latere costæ prominentibus 9-10, mediis a costa angulo  $40^{\circ}$ - $45^{\circ}$  egressis subarcuatis prope apicem attingentibus, venulis inter venas primarias transverse dispositis reticulatis, supra subnitida in exsiccato pallido-viridia subtus fulvo-glaucescentia, petiolis circ. 2 cm. longis primum hirsutis demum subglabris intus canaliculatis in canaliculo hirsutis fuscentibus. Gemma florifera ♀ 5-6-florata versus apicem ramulorum axillaris breve pedunculata (pedunculis 3 mm. longis pubescentibus) solitaria vel geminatim sita perulis 4-5 involucreta, perulis haud caducis interiore valde concavis glabris rotundatis 3-4 mm. in diametro extus pubescentibus, floribus subsessilibus vel brevissime tomentosis. Calycis tubus late campanulatus brevissimus  $\frac{1}{2}$  mm. longus extus tomentosus intus glaber, limbo 6-partito, segmentis subequalibus oblongis 2 mm. longis vel longioribus  $1\frac{1}{3}$  mm. latis apice triangulari-acutis basi haud vel vix contractis margine integris extus prope medium hirsutis intus glabris tenuissimis. Stamina 9 subulato-linearia 2 mm. longa sparse hirsuta vel glabra apice plus minus dilatata triangulari-acuta, ordinis I. et II. eglandulosa, ordinis III. plus minus breviora utroque latere glandulis aucta, glandulis antheri-formibus vel semi-oblongis  $1\frac{1}{2}$  mm. longis cum staminodiis plus minus connatis glabris. Ovarium ovoideum 1 mm. longum subglabrum

apice ad stylum abeuns, stylo  $2\frac{1}{2}$  mm. longo glabro columnari validiusculo basi gradatim dilatato ad ovarium abeunti, stigmatibus 2-formiter latere 2-lobato.

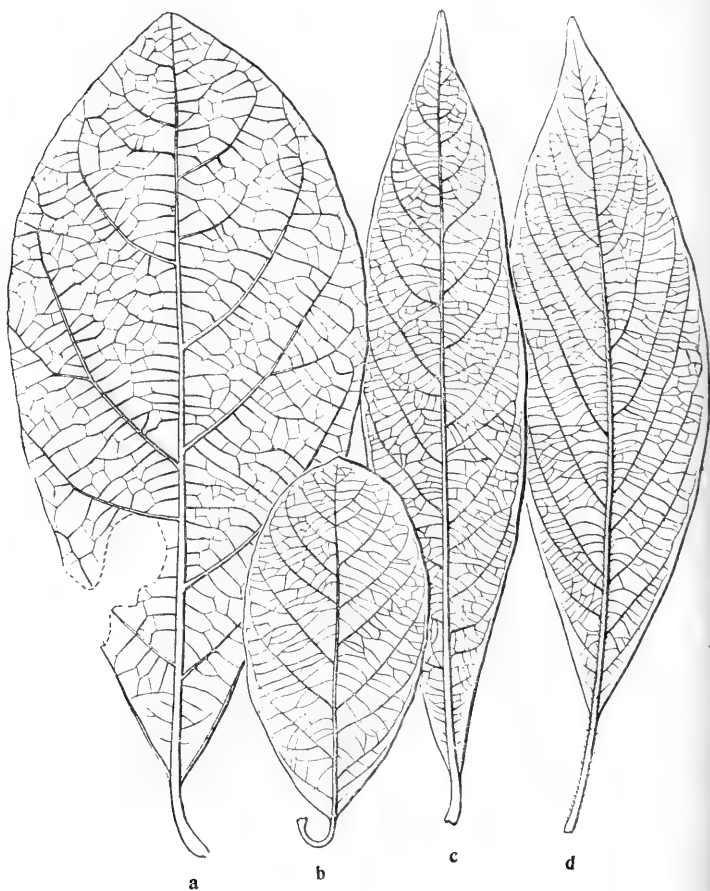


Fig. 58; a, *Litsea obovata* HAY.; b, *Litsea brideliifolia* HAY.; c, *Litsea Nakaii* HAY.; d, *Litsea acutivena* HAY.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *Litsea dolichocarpa* HAYATA, but different from it by the leaves with much more acutely arranged lateral veins.

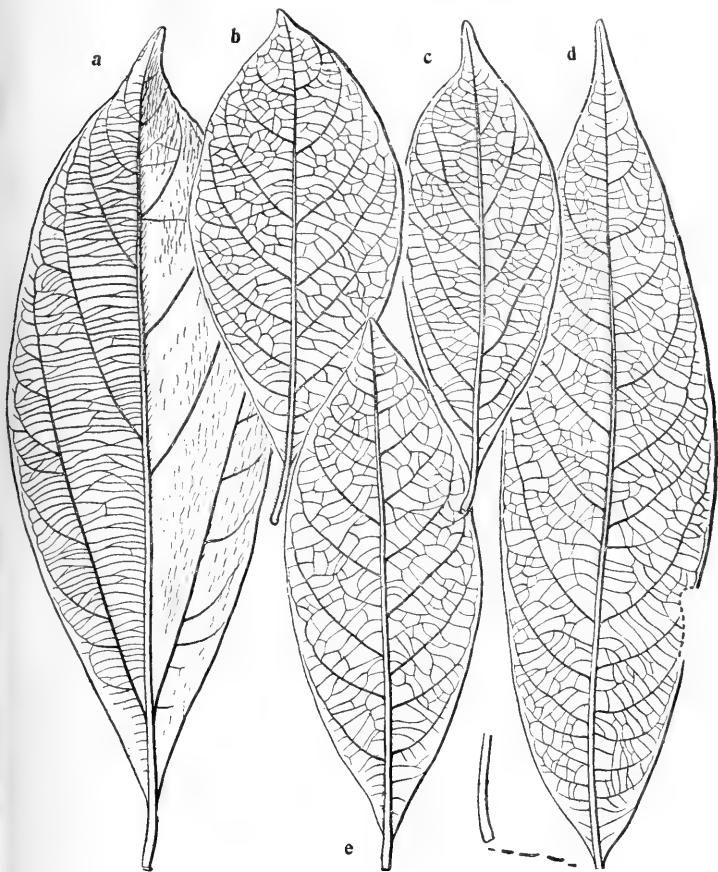


Fig. 59; a, *Tetradenia Konishii* HAYATA; b, *Litsea aboensis* HAYATA; c, *Nothophrbe Konishii* HAYATA; d, *Litsea dolichocarpa* HAYATA.

**Litsea akœnsis** HAYATA (Fig. 59-b). Mater. Fl. Formos. p. 245: Descriptio auctata:—Bacca elliptico-obovoidea 17 mm. longa 10 mm. lata apice rotundata basi obtusissima; cupula calycis late obconica vel subplana truncata 6 mm. in diametro.

HAB. Botansha, leg. S. KUSANO, (fr.).

Another specimen with fruits collected in Mt. Arisan by myself in 1914 is very probably referable to this species.

**Litsea brideliifolia** HAYATA sp. nov. (Fig. 58-b). Arbor? Rami et ramuli fusco-fulvescentes vel fuscentes subglabri, cortice glabro longitudinaliter ruguloso remote lenticellato, lenticellis leviter elevatis oblongis fulvis, ramulis ultimis fulvo-mollescentibus hirsutis. Folia chartacea obovata vel obovato-oblonga  $6\frac{1}{2}$  cm. longa 33 mm. lata apice rotundato-obtusa vel obtusissima vel late triangulari-acuta basi triangulari-cuneata acuta margine integra plana haud recurva vel plus minus repandula, costis venis supra vix vel haud elevatis subtus tenuissimis elevatis, venis lateralibus utroque latere costæ 7-8, mediis a costa angulo 50° egressis subrectis haud flexuosis circ. ad marginem attingentibus vel prope marginem evanescentibus, venulis gracillimis obscuris, reticulis supra plus subtus minus distincte visis, pagine supra in exsiccatō viridescencia haud nitida glabra ad costam paucē hirsuta subtus ferrugineo-colorata paucissime hirsuta vel subglabra, petiolis 1 cm. longis dense hirsutis intus sulcatis. Cymæ fructiferae axillares 3 cm. longæ totiusque latæ fulvo-hirsutæ, pedicello ultimo subaccrescenti; cupula 2 mm. in diametro, lobis calycis deciduis. Bacca globosa 6-7 mm. in diametro minute apiculata.

HAB. Hainan, leg. N. KONISHI, Juni. 1909, (No. 70).

**Litsea dolichocarpa** HAYATA sp. nov. (Fig. 59-d). Arbor 30 ped. alta. Ramuli validiusculi rubro-fulvescentes, cortice longitudinaliter fissō subsoluto glabro. Gemma foliifera oblonga apice basique obtusa vel ad apicem acuta 8 mm. longa  $4\frac{1}{2}$  mm. lata, perulis multiseriatim dispositis rotundatis apice rotundatis dorso tenuiter cinereo-pubescentibus ad marginem subglabris castaneo-coloratis integris haud ciliolatis. Folia chartacea oblanceolata vel lineari-lanceolata 12-15 cm. longa 28-38 mm. lata apice cuspidato-acuminata, acumine obtuso, basi obtusa vel cuneato-acuta margine integra haud recurva haud cartilaginea supra glabra fusco-viridescencia subtus breve hirsuta glauco-fulvescentia,

costa supra impressa subtus elevata, venis venulis supra tenuissime elevatis, subtus prominente elevatis castaneo-coloratis, venis lateralibus principalibus primariis utroque latere costæ circ. 10, additis 5-6 venis obscuris, mediis a costa angulo 50-55° egressis, inferioribus angulo 80° egressis, venulis inter venas primarias transversis reticulatis, petiolis 2 cm. longis glabris fuscentibus intus tenuissime canaliculatis. Flores ignoti. Bacca ellipsoidea vel obovoideo-ellipsoidea subnigricans vel fusca in vivo nitida 18 mm.-20 mm. longa 12 mm. lata apice rotundata basi obtusissima. Cupula concava 8 mm. in diametro, pedicellis incrassatis validiusculis 5-6 mm. longis pubescentibus.

HAB. Arisan: inter Suisharyō et Funkiko et inter Funkiko et Taroyen, leg. R. KANEHIRA, I. TANAKA et B. HAYATA, Aprili. 1914.

Near *Litsea nantaensis* HAYATA, but distinguishable from it by the ovoidal gemmæ and a little broader leaves with more elevated reticulation of the veinlets on the under surface.

***Litsea hypophæa*** HAYATA sp. nov. Arbor; rami et ramuli fusco-rubescens. cortice longitudinaliter fissis subsoluto hirsuto, ultimis sericeo-fulvo-pubescentibus. Gemma foliifera lineari-oblonga apice acuta, perulis dorso sericeo-pubescentibus ad marginem glabris. Folia elongato-oblonga apice obtusa acuta vel leviter cuspidato-acuta sed ad summum semper obtusa basi cuneato-obtusa vel cuneato-acuta margine subintegra vel subrepandula subplana vel angustissime recurva  $6\frac{1}{2}$ - $9\frac{1}{2}$  cm. longa 3- $3\frac{1}{2}$  cm. lata pagine supra in exsiccato fulvescentia subglabra (ad costas tenuiter sub-hirsuta) subtus flavo-fulvescentia pubescentia, costis et venis supra subplanis vel subimpressis subtus prominente elevatis, venis primariis lateralibus utroque latere costæ 6-9, mediis angulo 45° a costa egressis subarcuatis subrectis haud flexuosis, venulis supra non visis subtus tenuissime elevatis obscure reticulatis, chartacea vel chartaceo-coriacea, petiolis complanato-teretibus 5-6 mm. longis dense hirsutis haud vel vix sulcatis. Gemma florifera ♂ globosa versus apices ramulorum dense disposita, gemmis singulis circ. 4-floratis pedunculatis 5 mm. longis fulvo-pubescentibus, perulis 4 subpersistentibus vel deciduis rotundatis interiore valde concavis intus glabris extus breve sericeo-pubescentibus. Pedicelli florum brevissimi  $1\frac{1}{2}$  mm. longi villosi-hirsuti. Calycis tubus brevissimus utroque dense hirsutus, segmentis 6 oblongis tenuissimis  $2\frac{1}{2}$  mm. longis 1 mm. latis vel latioribus apice acutis basi plus minus contractis

intus glabris extus versus marginem glabris patentibus dorso subcarinatis ad carinam hirsutis. Stamina perfecta 8-10, filamentis filiformibus 4 mm. longis barbatis, antheris oblongis 1 mm. longis  $\frac{1}{2}$  mm. latis apice acutis vel obtusis 4-locellatis, ordinis III. glandulis auctis, glandulis irregulariter quadrangularibus  $\frac{2}{3}$  mm. longis breve stipitatis. Rudimentum ovarii nullum.

HAB. Rinkihō, leg. S. SASAKI, Mart. 1911, (fl. ♂).

Near *Litsea akensis* HAYATA, but different from it in having less elevated veinlets on the under surface of the leaves.

***Litsea Nakaii*** HAYATA sp. nov. (Fig. 58-c). Arbor; ramuli teretes fulvescentes dense tomentosi. Gemmæ foliiferæ elongato-oblongæ apice acutæ perulis rotundatis dorso sericeis ad marginem subglabris erosis castaneo-coloratis. Folia tenuiter coriacea oblanceolata lineari-oblanceolata 14-15 cm. longa 33 mm. lata apice breve acuminata, acumine obtusissimo, margine haud recurva, costa supra tenuiter impressa deorsum canaliculata subtus prominente elevata, venis venulis supra haud elevatis vel haud impressis obscure visis haud distinctis subtus prominente elevatis stramineo-coloratis, venis lateralibus primariis principalibus utroque latere costæ 10-14, mediis a costa angulo 45° egressis subrectis sursum subarcuatis prope marginem attingentibus, venulis inter venas oblique transversis reticulatis, pagine supra glabra in exsiccatō pallido-viridia subtus fulvo-glaucescentia breve hirsuta, petiolis complanato-teretibus primum tomentosis fuscentibus intus planis tenuiter sulcatis extus convexis deorsum 3 mm. latis. Flores non visi. Fructus prematurus ellipsoideus; cupula obconica dense sericeo-fulvo-hirsuta ad orem irregulariter fissa vel dentata.

HAB. Taitō: Aratraransha, leg. S. NAKAI, Dec. 1912.

Near *Litsea dolichocarpa* and *Litsea acutivena*, but distinguishable from them by the oblanceolate leaves with longe cuneate base.

***Litsea obovata*** HAYATA (Fig. 58-a). Mater. Fl. Formos. p. 252. Descriptio auctata: Gemma florifera ♀ globosa perulis involucrata pedunculata, pedunculis 5 mm. longis vel brevioribus fulvo-pubescentibus, perulis 5 rotundatis interiore valde concavis sub flore apertienti deorsum reflexis subpersistentibus 6-7 mm. in diametro intus subglabris extus sericeo-pubescentibus margine longe barbatis; capitulis florum 5-floratis. Flores ♀: brevissime pedicellati, pedicellis fulvo-pubescentibus 1 mm. longis validiusculis. Calycis tubus brevissime tubulo-



so- vel late campanulatus  $\frac{1}{2}$ –1 mm. longus extus plus fulvo-sericeo-villosus intus minus pubescens, segmentis 6 inaequalibus elongato-oblongis  $1\frac{1}{2}$ –2 mm. longis  $\frac{1}{2}$ –1 mm. latis membranaceis sed basi medioque plus minus crassis extus medio villosis prope marginem sursumque glabris intus toto glabris apice acutis vel obtusissimis basi haud contractis. Staminodia usque ad 12, ordinis I. et II. eglandulosa subulato-filiformia glabra  $1\frac{1}{2}$  mm. longa, ordinis III. et IV. utroque latere basis glandulis aucta, glandulis cordiformibus valde complanatis glabris  $\frac{1}{2}$  mm. longis totiusque latis. Ovarium tubo calycis inclusum glabrum elongato-ovoideum  $1\frac{1}{2}$ –2 mm. longum  $\frac{1}{2}$ – $\frac{2}{3}$  mm. latum apice fusiforme attenuatum basi obtusum apice gradatim ad stylum abeuns, stylo columnari-filiformi  $2\frac{1}{2}$  mm. longo glabro apice stigmatifero, stigmate x-formiter ramoso, ramis brevissimis.

HAB. Kagi: Kodaiho; Sankyakunanzan, leg. S. NAKAI, 1913, Nov., (fl. ♀).

*Actinodaphne* NEES.

***Actinodaphne hypoleucophylla*** HAYATA sp. nov. (Fig. 60-c). Arbor; ramuli fusco-cinerascentes subglabri teretes minute lenticellati, ramulis hornotinis angulatis ferrugineo-hirsutis 1 mm. latis. Gemma ignota. Folia tenuiter coriacea ad apicem ramuli hornotini vel ad apicem ramuli annotini congesta oblanceolata vel lanceolata  $3\frac{1}{2}$ –6 cm. longa 12–18 mm. lata apice breve acuta, acumine obtuso, basi cuneata basi obtusa margine integra leviter recurva supra glabra in exsiccatō fulvo-viridescencia subtus cinereo-glaucissima sub lente papillosa tenuissime hirsuta vel subglabra, costa supra impressa subtus elevata stramineo-colorata, venis supra tenuiter impressis subtus graciliter elevatis, venulis supra haud visis subtus vix visis, venis lateralibus primariis utroque latere costae 5–7 a costa angulo 50° egressis sub-flexuosis haud reticulatis, petiolis 4 mm. longis glabris intus vix vel tenuiter sulcatis. Gemma florifera ♀ ad latus ramulorum superiorum geminatim sita, (geminis subsessilibus vel brevissime pedunculatis apice perulis 4 instructis, perulis oblongo-triangularibus apice acutis extus hirsutis intus glabris castaneis), oblonga obtusa perulis 4 involucrata, perulis aliis 2 minoribus aliis 2 majoribus, minoribus orbicularibus 1 mm. longis dorso hirsutis intus glabris margine ciliolatis interiore valde concavis, majoribus conformibus sed longioribus oblongis 2 mm. longis apice obtusissimis. Flores solitarii in alabastro singulo, pedicellis subnullis. Calycis tubus 1 mm. longus obconicus extus hirsutus, segmentis 6 erectis oblongis apice obtusissimis  $1\frac{1}{3}$  mm. longis  $\frac{2}{3}$  mm.

latis extus basi medioque hirsutis versus marginem glabris intus subglabris basi plus minus hirsutis margine ciliolatis integris. Stamina lineari-filiformia

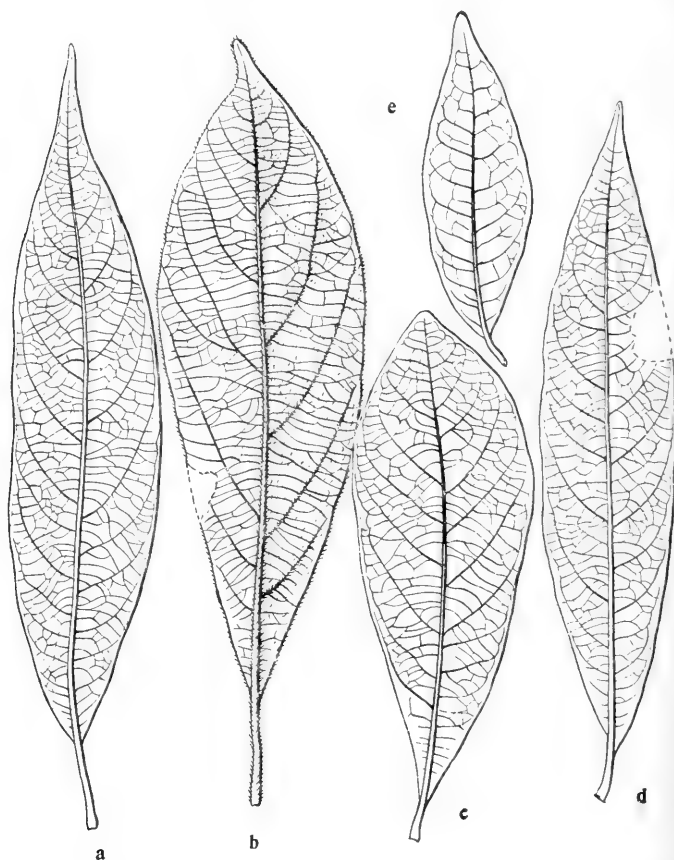


Fig. 60; a, *Actinodaphne nantoensis* HAY.; b, *Actino. musheensis* HAY.; c, *Actino. pedicellata* HAY.; d, *Actino. morrisonensis* HAY.; e, *Actino. hypoleucophylla* HAY.; all figures natural size.

1½ mm. longa hirsuta, ordinis I. et II. eglandulosa, ordinis III. glandulis utroque latere aucta, glandulis antheriformibus substipitatis. Ovarium oblique ovoideum ⅔ mm. longum glabrum, stylo validiusculo 2 mm. longo sparse hirsuto apice dilatato plus minus irregulariter horizontaliter lobato.

HAB. Holisha, leg. W. R. PRICE, (No. 704).

Remarkable for its floriferous gemmæ which are usually in pair, each of the pair having a single flower protected by two pairs of the perulæ.

**Actinodaphne morrisonensis** HAYATA (Fig. 60-d). Ic. Pl. Formos. III. p. 165.

**Actinodaphne mushænsis** HAYATA (Fig. 60-b). n. n. *Litsea mushænsis* HAYATA Mater. Fl. Formos. p. 250. Descriptio auctata: Gemma florifera late globosa axillaris vel ad ramulos lateraliter sita globosa 5 mm. in diametro breve pedunculata, pedunculis dense villosis 1-2 mm. longis vel longioribus pilis fulvescentibus, perulis rotundatis dorso sericeo-pubescentibus margine longe molleque barbatis intus glaberrimis. Flores glomerati, glomeris 5-6-floratis; floribus sub-sessilibus vel breve pedicellatis. Fl. ♂: pedicellis 1 mm. longis dense villosis. Calycis tubus brevissimus subnullus extus dense villosus intus dense barbatus, segmentis 3-6 inequalibus vel subæqualibus, longioribus oblongo-linearibus vel obovatis vel spathulatis 2½ mm. longis 1-2 mm. latis apice truncatis obtusis vel obtusissimis extus deorsum dense villosis intus glabris margine longe ciliato-barbatis. Stamina perfecta 9 (more Actinodaphne) rarius 10 (more Litsee): stamina ordinis I. eglandulosa, filamentis dense barbatis, antheris quadrangulatis. Stamina ordinis II. generaliter eglandulosa sed rarius glandulosa, stamina ordinis III. utroque latere manifeste glandulis aucta, glandulis cum antheris æquiformibus subsessilibus vel breve stipitatis; stamina ordinis IV. generaliter ad nullum reducta vel rarius 1-2, glandulis aucta, antheris minoribus. Rudimentum ovarii nullum. Fl. ♀ subsessiles; calycis tubus obconicus 1 mm. longus extus villosus intus glaberrimus; segmenta triangulari-ovata decidua apice acuta basi haud vel vix contracta intus glabra extus sericeo-villosa sursum glabra margine dense barbata 2 mm. longa 1 mm. lata. Staminodia lineari-filiformia basi barbata 1½ mm. longa glandulis utroque aucta, glandulis ∞-formibus vel auriculiformibus breve stipitatis, stipitibus ½ mm. longis barbatis. Ovarium ob- vel ovoideum 1 mm. longum glaberrimum urceolato-constrictum summo

truncatum cum stylo articulatum, stylo 2 mm. longo glaberrimo columniformi basi dilatato cum apice ovarii articulado.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912, (fl. ♀); ibidem leg. B. HAYATA, Mart. 1914, (fl. ♂).

**Actinodaphne nantœnsis** HAYATA (Fig. 60-a). Ic. Pl. Formos. III. p. 165.

**Actinodaphne pedicellata** HAYATA (Fig. 60-c). MATSUM. et HAYATA Enum. Pl. Formos. p. 351.

### *Tetradenia* NEES.

**Tetradenia acuminatissima** HAYATA (Fig. 61-d). Ic. Pl. Formos. III. p. 166. Descriptio auctata:—Gemma florifera ♂ 4-florata perulis 4-5 involucreta versus apicem ramulorum lateraliter solitariter vel geminatim sita sessilis, perulis deciduis. Pedicelli florum 4-5 mm. longi hirsuti. Calycis tubus brevissimus intus dense hirsutus extus sparse hirsutus, segmentis 4 subæquiformibus suborbicularibus  $2\frac{1}{2}$  mm. in diametro inferiore valde concavis deorsum reflexis intus glabris extus sparse pubescentibus margine barbato-ciliatis apice obtusis basi contractis tenuiter 5-nerviis. Stamina perfecta 6, filamentis 2 mm. longis rectis subcomplanatis basi hirsutis cæterum glabris, antheris quadranguliformibus 1 mm. longis minus quam 1 mm. latis utrinque truncatis vel apice obtusissimis introrse 4-locellatis; ordinis I. II. eglandulosa, ordinis III. glandulis reniformibus stipitatis utroque latere basi aucta. Rudimentum ovarii ovoideum subglabrum vel sparse hirsutum 1 mm. longum apice oblique styliiferum, stylo valde recurvo glabro 1 mm. longo apice valde dilatato, stigmate late infundibuliformi latere uno fisso.

HAB. Mt. Arisan: Aprili. 1914, leg. B. HAYATA et Takeo Itô, (fl. ♂); Nantô: Bigenzan, leg. U. MORI, Aug. 1906, (No. 1157).

**Tetradenia acuto-trinervia** HAYATA (Fig. 61-a). Ic. Pl. Formos. III. p. 166. Descriptio aucta: Gemma foliorum elliptico-oblonga apice acuta basi obtusa multiperulata, perulis extus pubescentibus fulvescentibus ad marginem castaneo-coloratis apice late triangularibus; gemma ad apicem ramulorum 3-4-congesta vel ad folia superiora axillaris. Gemma florifera globosa sessilis 4-florata ad latus ramulorum solitariter sita vel 5-6 glomeratim sita perulis 4-5 involucreta, perulis deciduis interiore valde concavis glabris circ. 5-nerviis.

Pedicelli florum ♂ 2-3 mm. longi tomentosi. Calycis tubus brevis late campanulatus extus tomentosus intus dense hirsutus, limbus 4-partitus, segmentis exterioribus majoribus orbicularibus  $3\frac{1}{2}$  mm. in diametro extus medio tomentosis versus marginem glabris ad marginem longe barbato-ciliatis integris intus glabris



Fig. 61; a, *Tetradenia acutotrinervia* HAY.; b, *Tetradenia kotoensis* HAY.; c, c', *Tetradenia aurata* HAY.; d, *Tetradenia acuminatissima* HAY.; e, *Tetradenia variabilissima* HAY.; f, *Tetradenia parvigemma* HAY.

deorsum reflexis interiore concavis apice sursum recurvis acutis basi plus minus contractis, segmentis interioribus minoribus oblongis  $3\frac{1}{2}$  mm. longis  $2\frac{1}{2}$  mm. latis. Stamina perfecta 6, triseriatim dimera, filamentis filiformibus complanatis crispato-recurvis 4 mm. longis basi hirsutis, antheris oblongis  $1\frac{1}{2}$  mm. longis minus quam 1 mm. latis apice cum partibus productis connectivorum acutis vel apiculatis haud apiculatis interdum emarginatis 4-locellatis introrsis, vel loculis 2 superioribus introrsis, 2-inferioribus lateraliter dehiscentibus; ordinis I. et II. eglandulosa, ordinis III. basi utroque latere glandulis aucta, glandulis sagittiformibus  $\frac{2}{3}$  mm. longis apice acutis stipitatis, stipitibus  $\frac{2}{3}$  mm. longis basi hirsutis. Rudimentum ovarii cum stylo fusiforme 3 mm. longum dense hirsutum apice dilatatum stigmatosum. Flores ♀ ignoti. Bacca obovoideo-ellipsoidea vel ellipsoidea 7 mm. longa; cupula subplana minuta 3 mm. in diametro margine plus minus fissa, pedicellis 7 mm. longis validiusculis erectis.

HAB. Arisan, (fr. et fl. ♂).

**Tetradenia aurata** HAYATA n. n. (Fig. 61-c and c'). *Litsea aurata* HAYATA Mater. Fl. Formos. p. 246.

**Tetradenia Konishii** HAYATA (Fig. 59-a). Ic. Pl. Formos. III. p. 167.

**Tetradenia kotensis** HAYATA (Fig. 61-b). sp. nov. Arbor. Rami et ramuli dense brevique velutinoso-pubescentes vel subglabrati, cortice fulvo-cinerascenti longitudinaliter fisso, ramulis ultimis fulvo-velutinoso-pubescentibus haud rugosis teretibus. Gemma foliifera ovata apice acuta vel obtusa dense ferrugineo-sericeo-pubescentis. Folia in magnitudine variabilissima tenuiter coriacea ovato-oblonga vel oblonga 9-20 cm. longa 38 mm.-80 mm. lata apice cuspidato-vel caudato-acuta vel acuminata, acumine acuto ad summum leviter obtuso, versus basin obtusa basi subito acuta margine angustissime cartilagineo-marginata integra plus minus repandula plus minus recurvata pagina in exsiccatto fulvescentia supra glabra nitida subtus pallida glauca, nervis venisque utraque pagine distinctis supra minus subtus plus elevatis, 3-nervia, nervis lateralibus cum nervo centrali ad 5-15 mm. conjugatis a nervo centrali angulo  $35^\circ$  egressis prope marginem evanescentibus subrectis haud veniferis a margine extrorsum 1-1 $\frac{1}{2}$  cm. distantibus, nervo centrali ad apicem acuminis ipsum extenso utroque latere venis 2-3 a nervo angulo  $45^\circ$  egressis medio subito arcuatis prope marginem evanescentibus, venulis inter nervos tenuissimis obscuris, reticulis

venularum obscuris, petiolis 1-2½ cm. longis densissime fulvo-hirsutis intus obscure canaliculatis. Gemma florifera (i.e. inflorescentia) ad latus ramulorum glomeratim sita rotundata. Flores apertientes non visi.

HAB. Kōtōshō, leg. K. MIYAKE, Nov. 1899, (typ. !); ibidem, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912.

**Tetradenia parvigemma** HAYATA sp. nov. (Fig. 61-f). Arbor; rami ramuli glabri siccitate fusco-purpurascens, cortice longitudinaliter minuteque rugoso irregulariter lenticellato vel haud lenticellato, lenticellis si adsunt linearibus. Gemma foliorum ovoidea in specimine nostro 6 mm. longa 3½ mm. lata apice acuta vel obtusa vel obtusissima ferrugineo-sericeo-pubescent vel castaneo-velutinoso multiseriatim perulata, perulis subrotundatis dorso dense sericeo-ferrugineo-hirsutis ad marginem haud glabratis. Folia tenuiter coriacea ovato-oblonga vel obovato-oblonga 9 cm. longa 3½ cm. lata apice acuminata vel cuspidato-acuta ad summum obtusa basi obtusa vel interdum rotundata vel acuta, costis utraque pagine leviter elevatis vel supra plus subtus minus elevatis, venis tenuissimis gracilibus paucis utraque pagine vix vel haud elevatis, margine integra angustissime cartilagineo-marginata haud recurvata utraque pagine glaberrima siccitate pallidissima minute distincte reticulata, reticulis utraque pagine elevatis, areolis reticulorum utraque pagine impressis, 3-nervia, nervis lateralibus basi cum nervo centrali ad 1-2 mm. conjugatis a nervo centrali angulo 25° egressis plus minus arcuatis sursum prope marginem evanescentibus a margine medio 7 mm. distantibus extrorsum vix vel haud veniferis, nervo centrali ad acumen ipsum extenso sursum venifero, venis utroque latere 2 gracilibus tenuissimis obscuris, venulis inter nervos subtransversis —formiter arcuatis tenuissimis, venulis reticulatis, reticulis minutis distinctis, margine infra acumen repanda, petiolis 18 mm. longis glabris intus tenuissime sulcatis. Gemma florifera (i.e. inflorescentia) ad axillas foliorum superiorum geminatim sita, (geminis brevissime pedunculatis basi perulis minutis late rotundatis firme involucretis, perulis persistentibus hirsutis 1-2 mm. longis, pedunculis 1-2 mm. longis) 5-7-florata basi perulis instructa, perulis caducissimis, pedicellis 2 mm. longis fulvo-tomentosis. Fl. ♂ ignoti. Fl. ♀ calycis tubus obconicus 1 mm. longus extus intusque hirsutus, segmentis triangulari-oblongis 1 mm. longis ⅔ mm. latis apice acutis basi haud contractis extus hirsutis intus glabris. Staminodia

linearia non satis nota. Ovarium ovoideum 1 mm. longum apice dense hirsutum basi subglabrum, stylo non satis noto.

HAB. Akōchō: Kwarinsan, leg. S. SASAKI, Mart. 1910 (fl. ♀).

Near *Tetradenia variabilissima* HAYATA, but differs from it by the quite glabrous leaves and the very small ovoidal gemmæ.

***Tetradenia variabilissima*** HAYATA (Fig. 61-c). Ic. Pl. Formos. III. p. 167.

***Lindera*** THUNB.

***Lindera akensis*** HAYATA (Fig. 62-c). Mater. Fl. Formos. p. 252.

***Lindera communis*** HEMSLE. (Fig. 62-f); HAYATA Mater. Fl. Formos. p. 254: Descriptio auctata: Gemma foliifera elongato-oblonga 1 cm. longa  $3\frac{1}{2}$  mm. lata apice acuta basi obtusa fulvo-sericeo-villoso-pubescent multiperulata, perulis inferioribus late rotundatis, superioribus longe rotundatis extus medio fulvo-sericeo-pubescentibus prope marginem glabris castaneo-coloratis intus glabris margine ciliolatis apice plus minus apiculatis; gemma florifera globosa sessilis 5 mm. in diametro, perulis late rotundatis. Flores ♂ ad axillas foliorum superiorum glomerato-umbellati vel ad ramulos laterales, umbellis 10-8-floratis sessilibus, perulis rotundatis vel oblongis apice rotundatis extus plus pubescentibus intus minus pubescentibus, pedicellis 2 mm. longis villosis. Calycis tubus campanulatus  $1\frac{1}{2}$  mm. longus 2 mm. latus intus parce hirsutus, limbo 5-lobato, lobis 6 oblongis 3 mm. longis 2 mm. latis apice obtusissimis basi plus minus contractis margine integris interiore recurvis interiore concavis patentibus utraque pagine prope medium parvisissime pubescentibus, pilis longiusculis. Stamina ordinis I. et II. eglandulosa ad apicem tubi vel ad basin limbi affixa, filamentis complanatis subglabris 2 mm. longis, antheris oblongo-ovatis plus quam 1 mm. longis minus quam 1 mm. latis apice connectivis plus minus productis obtusis introrsum 2-locellatis; stamina ordinis III., filamentis utroque latere glandulis auctis, glandulis reniformibus in forme variabilissimis sulcatis  $\frac{1}{2}$  mm. longis totiusque latis, stipitibus 1 mm. longis ad totam longitudinem cum filamentis connatis;

Note: So far as are concerned the Formosan species of the *Litsea*-group, *Tetradenia* is very well defined from *Litsea* and *Actinodaphne*, in having trinerved leaves and dimerous flowers; but the latter two are not very clearly separated each other, the number of stamens being variable from 9 to 12 or even more.



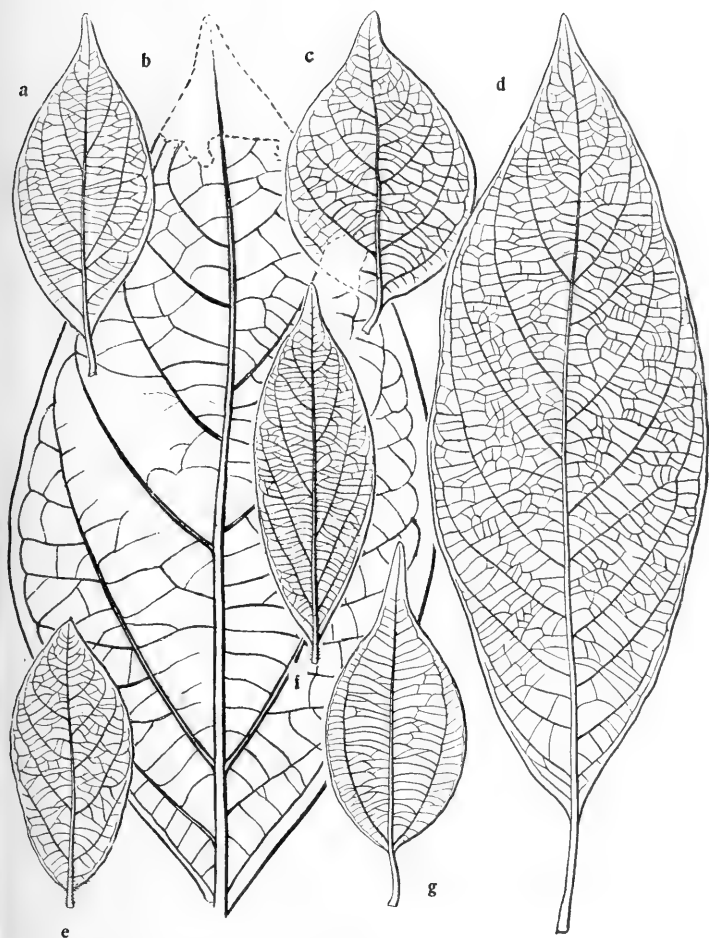


Fig. 62; a, *Lindera formosana* HAYATA; b, *Lindera randaiensis* HAYATA; c, *Lindera akensis* HAYATA; d, *Lindera Oldhami* HEMSL.; e, *Lindera glauca* var. *Kawakamii* HAYATA f, *Lindera communis* HEMSL.; g, *Lindera strychnifolia* S. et Z.

stamina ordinis IV. toto reducta nulla vel rarissime columniformia abortiva. Rudimentum ovarii oblongo-ovoideum 1 mm. longum glabrum, stylo columnari  $1\frac{1}{2}$  mm. longo apice truncato inferiore hirsuto. Fl. ♀ quam fl. ♂ minora; tubus calycis floris feminei intus in fundo dense hirsutus caeterum glaber; segmenta limbi  $1\frac{1}{2}$  mm. longa 1 mm. lata oblongo-triangularia apice obtusissima prope basin utraque pagine hirsuta; staminodia ordinis I. et II. eglandulosa ad basin segmentorum affixa linearia minus quam 1 mm. longa  $\frac{1}{2}$  mm. lata apice obtusa basi plus minus dilatata; staminodia ordinis III. glandulosa, filamentis basi valde dilatatis supra basin utroque latere glandulis auctis, glandulis cordi-formibus vel deformibus  $\frac{1}{2}$  mm. longis totiusque latis. Ovarium ovoideum vel obovoideum glabrum plus quam 1 mm. longum minus quam 1 mm. latum apice plus minus obliquum, stylo oblique recurvo apice stigmatifero, stigmate valde dilatato. Bacca subglobosa 8 mm. in diametro glabra; cupula (i.e. tubus calycis) intus concava glabra 3 mm. in diametro extus hirsuta.

HAB. Akō: in regionibus aboriginum, leg. TAYEMON ITō, Dec. 1909, (fr.); Mt. Arisan: leg. S. SASAKI, Mart. 1911, (fl. ♂); ibidem, (fl. ♀: No. 6).

**Lindera formosana** HAYATA (Fig. 62-a) Mater. Fl. Formos. p. 255.

**Lindera glauca** BLUME var. **Kawakamii** HAYATA (Fig. 62-c) l.c.p. 255.

**Lindera Oldhami** HEMSL. (Fig. 62-d) HAYATA l.c.p. 256.

**Lindera Pricei** HAYATA sp. nov. Arborescens, ramulis validis teretibus glabris, cortice fulvo vel fusco lenticellis rotundatis 1 mm. in diametro notato. Gemma ignota. Folia chartacea elongato-obovata 20 cm. longa 8 cm. lata apice obtusa (?) basi triangulari-cuneato-attenuata margine integra, (partibus cuneatis margine rectis), pagine utraque glaberrima supra nitida in exsiccato fusconigricantia subtus pallidissima cinerascens, costa supra impressa subtus elevata, venis supra haud vel vix elevatis subtus elevatis, venulis supra subtusque elevatis, reticulis venularum supra distincte elevatis subtus vix elevatis, costis venis venulis supra fusco-coloratis, venis laterulibus primariis utroque latere costae 10-13, mediis a costa angulo 60° egressis arcuatis, petiolis 25 mm. longis glabris plano-convexis intus planis extus convexis leviter latere compressis basi haud incrassatis angulato-teretibus. Gemma florifera ad axillas foliorum superiorum solitaria vel geminatum sita globosa pedunculata, pedunculis 8 mm. longis glabris, perulis 4-5 involuata, perulis rotundatis 1-1 $\frac{1}{2}$  cm. in diametro

interiore cuculliforme concavis basi 4-5 mm. latis extus sericeo-pubescentibus intus glabris margine tenuissimis ciliato-barbatis. Flores ♂ circ. 30 umbellatim dispositi, radiis vel pedicellis 7-8 mm. longis barbatis apice ad calycem abeuntibus gracilibus. Calycis tubus brevissimus intus barbatus, limbus circ. 6- rarius 8-partitus, segmentis subæqualibus patentissimis spathulato-oblongis 4-5 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusis obtusissimis margine integris intus glabris extus glabris vel pauce medio barbatis intus plus minus concavis. Stamina perfecta 9 : ordinis I. et II. eglandulosa, filamentis gracilibus filiformibus 4 mm. longis barbatis, antheris ovato-oblongis 1 mm. longis glabris apice connectivis productis, partibus productis triangularibus apiculiformibus complanatis  $\frac{1}{3}$  mm. longis introrsum 2-locellatis glabris: stamina ordinis III. glandulosa, glandulis infundibuliformibus 1 mm. longis totiusque latis transverse patentibus ad latus utrumque filamentorum infra medium affixis sessilibus vel stipitatis, stipitibus cum filamentis connatis glabris. Rudimentum ovarii obovoideum 1 mm. longum glabrum, stylo 2 mm. longo columnari-filiformi.

HAB. Mt. Randai, ad 1000 ped. alt., leg. W. R. PRICE, (No. 199).

Near *Lindera Oldhami* HEMS., but easily distinguishable from it in having thinner leaves with a narrowly cuneate base.

***Lindera randaiensis*** HAYATA (Fig. 62-b). HAYATA Mater. Fl. Formos. p. 257.

***Lindera strychnifolia*** S. et Z. (Fig. 62-g).

HAB. Hokusanko, ad 3000 ped. alt., leg. W. R. PRICE, Mart. 1912 (fl. ♀).

Compared with a Japanese specimen preserved in the Tōkyō herbarium.

## Thymelæaceæ.

### *Wikstrœmia* ENDL.

***Wikstrœmia mononectaria*** HAYATA sp. nov. (Fig. 63). Suffrutex. Rami et ramuli gracillimi teretes fusco-purpurascentes glabri, cortice sublevi vel paucissime ruguloso. Folia subopposita vel alterna subdistiche disposita oblongo-ovata  $2\frac{1}{2}$ -5 cm. longa 1-2 cm. lata apice triangulari-acuta basi late triangulari-acuta margine integra utraque pagine glabra subtus pallidissima tenuissime membranacea vel chartacea costis venisque utraque pagine elevatis venis primariis lateralibus arcuatis utroque latere 10-11, petiolis 2-3 mm. longis

rubrescentibus. Racemi terminales vel quasi-axillares (ibique) oppositifolii cum pedunculis 4 cm. longi glaberrimi haud bracteati, pedunculis  $\frac{1}{2}$ –1 cm. longis; pseudo-rhachibus rectis circ. 2 cm. longis, pedicellis  $1\frac{1}{2}$  mm. longis a se 1–2 mm. remotis apice sub-cupuliformibus sub flore articulatis. Perianthium rubro-purpurascens elongato-cylindricum  $1\frac{1}{2}$  cm. longum vix 1 mm. latum basi angustius sursum latius, limbo plus minus latiore 4-lobato, lobis rotundatis 2 mm. longis  $1\frac{1}{2}$  mm. latis apice rotundatis intus concavis plus minus patentibus glaberrimis. Stamina 8, altris 4 parte perianthii a basi sursum  $\frac{3}{4}$  altitudine sitis, filamentis liberis filiformibus  $\frac{1}{2}$  mm. longis, antheris linearibus plus quam 1 mm. longis  $\frac{1}{3}$  mm. latis apice obtusis basi 2-lobatis. Discus linearis 2 mm. longus  $\frac{1}{4}$  mm. latus apice 2-lobatus complanatus hypogynus lato uno ovarii situs. Ovarium longe stipitatum obovoideum stipitibus exceptis 1 mm. longum  $\frac{1}{2}$  mm. latum glabrum 1-loculare 1-ovulatum, stipitibus  $1\frac{1}{2}$  mm. longis basi cum perianthio connatis sursum liberis; stylus glaber  $\frac{1}{4}$  mm. longus, stigmate oblongo-globoso  $\frac{1}{2}$  mm. longo dense breve hirsuto.

HAB. Uraisha, leg. H. INABA, Juli, 1913, fl.

Near *Wikstrœmia japonica* MIQ., but differs from it in having much longer racemes, larger flowers, glabrous ovary and especially by the linear undivided single glands rising from the base of the ovary on one side of the latter

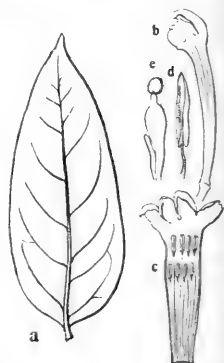


Fig. 63, *Wikstrœmia mononectaria* HAYATA; a, a leaf, natural size; b, a flower, before opening,  $\times 2.5$ ; c, corolla, expanded,  $\times 2.5$ ; d, a stamen,  $\times 10$ ; e, ovary with a single nectar, magnified.

## Loranthaceæ.

### *Loranthus* LINN.

***Loranthus chinensis*** DC.; Benth. Fl. Hongk. p. 141. Frutex, ad ramos arboris *Umi Nephelique* parasiticus. Rami subleves tenuissime rugulosi fusco-rubro-purpurascens subglabri densiuscule minuteque lenticellati, lenticellis  $\frac{1}{4}$  mm. in diametro minutissimis rotundatis, ramulis ultimis teretibus dense rubro-tomentosis, tomentis caducissimis. Folia opposita chartacea subconcolora in

exsiccatō fusco-fulvescentia vel supra plus fuscentia ovata ovato-oblonga 6 cm.— $5\frac{1}{2}$  cm. longa 4 cm.—33 mm. lata apice obtusissima triangulari-obtusa basi obtusa vel rotundata margine integra vel subrepanda (utraq̃ue pagine subglabra ad costas rugosissima), costa supra minus subtus plus elevata plus minus flexuosa vel subrecta, venis utraq̃ue pagine elevatis utroque latere costæ 4-5 medio sursum arcuatis cum eis superioribus junctis, mediis a costa angulo 50° egressis, petiolis 7 mm. longis intus planis extus convexis glabris rugosis. Flores ad latus ramorum siti breve pedunculati et pedicellati, pedicellis dense ferrugineo-tomentosis 2 mm. longis apice bracteis oblongis 1 mm. longis extus dense ferrugineo-tomentosis intus glabris instructis. Calycis tubus stipitatus, (stipitibus 2 mm. longis fulvo-tomentosis apice gradatim ad tubum calycis abeuntibus), obconicus  $1\frac{1}{2}$  mm. longus apice  $1\frac{1}{2}$  mm. latus, limbo circ.  $\frac{1}{4}$  mm. longo extus tomentoso intus glabro margine crosso-denticulato. Corollæ tubus cylindricus recurvus  $1\frac{1}{2}$  cm. longus 3 mm. latus extus parce pubescens intus glaber, limbo 4-partito, partibus linearibus 7 mm. longis minus quam 1 mm. latis apice acutis vel cuspidato-acutis deorsum infra medium subito flexis deorsum exteriorē reflexis intus concavis. Stamina 4, filamentis 3 mm. longis  $\frac{1}{2}$  mm. latis intus hand canaliculatis, antheris  $1\frac{1}{4}$  mm. longis  $\frac{1}{4}$  mm. latis linearibus apice obtusissimis. Ovarium inferius apice glabrum ruguloso-planum, stylo filiformi 18 mm. longo tetragono apice globulifero stigmatoso.

HAB. Fokien: Usekizan, Oct. 1909, (fl.) leg. S. NAGASAWA.

The type I have never seen. So far as is concerned the description given in BENTH. Fl. Hongk. p. 141, it is very likely that our *Loranthus* may be identical with the Hongkong plant. Remarkable for its stalked calyx which is articulated with a pedicel.

**Loranthus lonicerifolius** HAYATA sp. nov. Rami fuscentes vel fusco-cinerascentes minute lenticellati subglabri versus apicem tenuiter tomentosi. Folia coriacea ovato-oblonga vel oblonga 5 cm. longa 23 mm. lata apice obtusa vel obtusissima basi rotundata supra primum tomentosa demum glabrata in exsiccatō fuscentia, (costis venis elevatis distincte visis), subtus semper rufo-tomentosa, costa subtus elevata sed venis subtus impressis, margine tenuissime deorsum recurva, petiolis 8 mm. longis supra intus late sulcatis. Flores ad latus ramorum fasciculatim siti, fasciculis sessilibus vel breve pedunculatis, pedunculis

1-2 mm. longis brevis fulvo-rubro-tomentosis, pedicellis nullis vel 1 mm. longis apice ad latus unum 1-bracteatis, bracteis crassis rotundato-triangularibus apice obtusissimis extus tomentosis intus glabris intus concavis. Calyx tubuloso-urceolatus 2 mm. longus totiusque latus extus dense tomentosus apice plus minus contractus ad marginem denticulatus intus cum apice ovarii glaber. Corollæ tubus crassus lineari-oblongus 16 mm. longus 4 mm. latus versus apicem plus minus contractus basi valde constrictus ad extremitatem  $\frac{1}{2}$  mm. latus plus minus recurvus, limbus 4-partitus, partibus lineari-spathulatis  $6\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis crassis apice acutis basi attenuatis apice intus concavis in flore apertienti supra basin subito flexis exteriore deorsum valde reflexis apice semper interiore incurvis intus cum tubo glabris. Stamina 4 ad basin loborum corollæ affixa, filamentis 3 mm. longis  $\frac{1}{2}$  mm. latis valde complanatis medio canaliculatis apice gradatim ad antheram abeuntibus, antheris  $1\frac{1}{2}$  mm. longis minus quam  $\frac{1}{2}$  mm. latis apice obtusis, connectivis haud productis. Ovarium inferum cum calycis connatum apice glabrum, stylo filiformi erecto exserto 22 mm. longo glabro tetragono, stigmate terminali globuloso.

*Loranthus Yadoriki* HAYATA Fl. Mont. Formos. p. 191, (non SIEB.).

HAB. Mt. Morrison, ad 7000 ped. alt., Oct. 1906, (No. 7007), leg. U. MORI.

Near *L. rhododendricolus* HAYATA, but separable from it by the much shorter anthers.

**Loranthus** sp. Frutex ad ramos *Loranthi phæbe-formosani* HAYATA crescens. Rami subglabri cinerascens rugulosi, lenticellis minutis medio fissis, ramulis in exsiccato fuscantibus. Folia opposita coriacea ovata vel oblonga  $3\frac{1}{2}$  cm.-4 cm. longa  $1\frac{1}{2}$  cm.-2 cm. lata apice rotundata obtusissima basi obtusa vel prope basin subito cuneata ad petiolum abeuntia utraque pagina glabra haud nitida, costis venis utraque pagine obscure elevatis, margine integra, petiolis alatis 7-6 mm. longis. Flores spicati, spicis toto glabris 3-4-fasciculatis, spicis 2 cm. longis. Flores toto glabri approximativè siti sub flore 1-bracteati, bracteis brevissimis triangularibus 1 mm. latis  $\frac{1}{4}$  mm. longis late acutis. Calyx in forcibus rhachis spicæ semi-immersus insitus urceolato-semi-globosus 1 mm. longus totiusque latus, limbo erecto  $\frac{1}{2}$  mm. longo margine subintegro sparse ciliolato. Petala erecta 5 glabra linearia minus quam  $1\frac{1}{2}$  mm. longa minus quam  $\frac{1}{2}$  mm. lata valvata intus plus minus concava apice acuta. Stamina 5, filamentis

complanatis linearibus  $\frac{2}{3}$  mm. longis basi ad medium cum petalo connatis glabris, antheris adnatis  $\frac{1}{6}$  mm. longis  $\frac{1}{3}$  mm. latis 2-locularis, connectivis latis apice obtusis. Ovarium inferius apice glabrum, stylo validissime columnari  $1\frac{1}{4}$  mm. longo glabro apice pyramido-acuto.

Near *L. Owatarii* HAYATA; but differs from it by the very much smaller flowers.

**Loranthus Phœbe-formosanæ** HAYATA sp. nov. Frutex ad ramos arboris parasiticus; ramuli teretes, cortice cinerascenti transverse fissis densiuscule lenticellato, lenticellis rotundatis vel transverse oblongis transverse 2-fissis elevatis ferrugineo-coloratis, ramulis ultimis gracillimis dense adpresse lepidoto-tomentosis, tomentis rubro-ferrugineis. Folia in exsiccatu coriacea  $4\frac{1}{2}$  cm. longa 2 cm. lata apice triangulari-obtusa vel obtusissima basi obtusa vel obtusissima margine integra vix vel haud recurva, costis et venis supra tenuissime elevatis, costa subtus prominente elevata, venis haud elevatis haud visis, primariis utroque latere costæ 4-5 a costa angulo variabilissimo egressis, pagina supra in exsiccatu glabra fuscentia vel pallida subtus albo-rubescencia dense adpressequ lepidoto-tomentosa, tomentis albo-rubescens, petiolis 6 mm. longis intus sursum costatis deorsum vix canaliculatis dense tomentosis. Flores lignosi ad latus ramorum siti subumbellatim 3-5-fasciculati, fasciculis breve pedunculatis 3 mm. longis breve fulvo-tomentosis, bracteis triangularibus crassiusculis 1 mm. longis. Flores tubiformes toto extus breve tomentosi plus minus recurvi  $1\frac{1}{2}$  cm. longi. Calyx tubiformis  $2\frac{1}{2}$  mm. longus minus quam 2 mm. latus apice vel ad orem ciliolatus 4-dentatus (dentibus minutis) vel subinteger extus dense tomentosus intus cum apice ovarii glaber. Corolla crassa plus quam 1 cm. longa, tubo 7 mm. longo medio plus minus latiore ad medium 2 mm. lato, limbo 4-partito, partibus linearibus spathulatis 6 mm. longis  $1\frac{1}{2}$  mm. latis apice obtusissimis basi attenuatis in flore apertienti patentibus (vel reflexis?) valvatis valde crassis extus dense tomentosis intus glabris interiore concavis. Stamina 4 lobis corollæ opposita, filamentis sub lobis corollæ ad apicem tubi affixis  $2\frac{1}{2}$  mm. longis glabris complanatis intus late sulcatis ad antheram abeuntibus, antheris 2 mm. longis minus quam  $1\frac{1}{2}$  mm. latis linearibus apice obtusis, loculis linearibus connectivis apice plus minus productis linearibus dorso  $\frac{1}{3}$  mm. latis cum filamentis concoloribus. Ovarium inferum cum tubo calycis connatum apice glabrum, stylo filiformi

erecto 13 mm. longo exserto glabro in sectione tetragono clavato, stigmatibus globosis terminalibus. Fructus pyriformis 9 mm. longus 7 mm. latus apice truncato-rotundatus basi contracto-attenuatus basi latere uno bracteifer extus dense brevique tomentosus.

HAB. Mt. Arisan: inter Suisharyō et Funkiko, leg. R. KANEHIRA, I. TANAKA et B. HAYATA, Aprili. 1913.

Remarkable for its very thick and nearly ligneous corolla.

**Loranthus rhododendricolus** HAYATA sp. nov. Frutex ad ramos *Rhododendri Mori* parasiticus. Rami cinerascens vel fuscescentes, ramulis versus apicem brevissime rubro-tomentosis. Folia ovato-oblonga vel lanceolato-ovata  $4\frac{1}{2}$  cm. – 6 cm. longa 2 cm. lata apice obtusa vel obtusissima basi obtusissima vel rotundata margine integra coriacea primum utraque pagina densissime stellato-tomentosa demum supra subglabrata in exsiccato fuscescentia subtus semper dense adpresse stellato-tomentosa rubescentia, supra costis venisque elevatis subtus costa elevata venis laevibus elevatis, petiolis 6 mm. longis. Flores ad latus ramorum glomeratim siti, glomeris breviter pedunculatis  $1\frac{1}{2}$  mm. longis dense tomentosis, pedicellis nullis vel brevibus apice ad latus singulum 1-bracteatis, bracteis oblongo-triangularibus 2 mm. longis apice obtusissimis basi laevibus contractis extus dense tomentosis intus glaberrimis. Flores apertientes non visi. Calycis tubus 1 mm. longus totiusque latus extus dense tomentosus, limbo brevissimo  $\frac{1}{2}$  mm. longo margine 4-dentato, dentibus latissime triangularibus  $\frac{1}{3}$  mm. longis minus quam 1 mm. latis extus dense tomentosis intus glaberrimis. Corollae tubuliformes apertientes laevibus 4-lobatae. Stamina 4, antheris linearibus 3 mm. longis  $\frac{3}{4}$  mm. latis 2-ocularibus. Ovarium inferius apice glabrum stylophoris laevibus visis, stylo glabro filiformi subtetragono apice acuto-clavato stigmatoso.

HAB. Mt. Arisan, ad 7000 ped. alt., ad ramos *Rhododendri Mori* HAYATA crescens, leg. B. HAYATA, Mart. 1914.

Near *L. seraggodostemon* HAY., but differs from it by the not porous but normally 2-celled anthers; also allied to *L. tonicerifolia* HAY., but distinguishable from it in having much longer anthers.

**Loranthus ritozanensis** HAYATA sp. nov. Frutex ad ramos arboris crescens. Rami fusco-cinereascentes, lenticellis minutis transverse fissis, rugulosis versus apicem minute tenuissime tomentosi. Folia subopposita coriacea ovato-vel



obovato-oblonga  $4\frac{1}{2}$ –5 cm. longa 22–25 mm. lata apice rotundata vel obtusissima basi cuneata margine integra, costis venisque supra plus distincte elevatis subtus minus elevatis, utraque pagine glaberrima laud nitida, petiolis 3 mm. longis complanatis. Flores ad latus ramorum glomeratim siti pedunculati vel sessiles. Flores apertientes non visi, bracteis sub calyce cuspidato-triangularibus  $1\frac{2}{3}$  mm. longis basi plus 1 mm. latis extus dense adpresse tomentosis intus glabris margine dense tomentosis. Calycis tubus 2 mm. longus totiusque latus apice basique æquilatus, limbo  $\frac{1}{2}$  mm. longo margine croso extus tomentoso intus glabro margine tomentoso. Corollæ apertientes non visæ in alabastro tubiformes 18 mm. longæ  $1\frac{1}{2}$  mm. latæ extus sparse vel laud pubescentes intus glabræ. Stamina 4, antheris linearibus 4 mm. longis minus quam  $\frac{1}{2}$  mm. plus quam  $\frac{1}{3}$  mm. latis apice obtusissimis basi cum filamentis æquilatis. Stylus filiformis tetragonus.

HAB. Mt. Ritōzan, leg. T. KAWAKAMI, 1913.

Very near *L. theifer* HAY., but differs from that by the very much longer anthers.

**Loranthus seraggodostemon** HAYATA sp. nov. Frutex ad ramos arboris parasiticus. Rami ramuli gracillimi fusco-purpurascens subglabri vel adpresse lepidoto-tomentosi. Folia chartacea vel tenuiter coriacea oblonga vel ovato-oblonga 6–9 cm. longa 3–4 cm. lata apice obtusa vel triangulari-obtusa basi obtusa vel acuta vel rotundata margine subintegra, costa supra plana laud elevata subtus tenuiter elevata vel tenuiter impressa, venis utraque pagine tenuissime elevatis, venis lateralibus primariis utroque latere costæ 7–9, mediis a costa angulo 50° egressis rectis deorsum laud arcuatis sursum subito arcuatis cum eis superioribus junctis, pagine supra fuscentia subglabra vel primum tenuiter albo-stellato-pubescentia subtus tenuiter dense stellato-tomentosa rubrocinerascentia, tomentis valde tenuissimis, petiolis  $1\frac{1}{2}$  cm. longis tenuiter pubescentibus. Flores ad latus ramorum glomerati, glomeris sessilibus vel pedunculatis, floribus generaliter sessilibus vel breve pedicellatis, pedicellis 2 mm. longis apice bracteis singulis instructis, bracteis oblongis  $1\frac{1}{2}$  mm. longis apice acutis extus tomentosis intus glabris. Calyx urceolatus tubuliformis 3 mm. longus  $1\frac{1}{2}$  mm. latus extus tomentosus utroque truncatus apice quam basi sensim latior, tubo apice plus minus constricto, limbo  $\frac{1}{3}$  mm. longo margine late 4-lobato, lobis brevissimis  $\frac{1}{3}$  mm. longis  $\frac{2}{3}$  mm. latis utraque subglabris sca-

riosis margine dense hirsutis. Corollæ lineari-tubuliformes 3 cm. longæ recurvæ extus tenuiter tomentosæ intus glabræ, tubo 2 cm. longo infra medium latiore 2 mm. lato, limbo 5-partito, partibus angustissime linearibus 1 cm. longis minus 1 mm. latis suberassiusculis a basi usque ad apicem æquilatis apice acutis vel obtusis extus sparse tomentosis intus glabris inferiore concavis supra basin subito flexis apice interiore incurvis. Stamina 4 lobis corollæ opposita, filamentis basi lobo corollæ affixis  $1\frac{1}{2}$ -2 mm. longis  $\frac{1}{2}$  mm. latis valde complanatis glabris haud sulcatis cum antheris æquilatis, antheris linearibus 6 mm. longis  $\frac{1}{2}$  mm. latis apice obtusis facie interiore multiporatis, poris 4-seriatim longitudinaliter approximativque dispositis oblongis  $\frac{1}{4}$  mm. longis, connectivis vix vel haud productis. Ovarium inferius apice glabrum ad centrum stylophoris tetragonis coronatum, stylo filiformi 3 cm. longo tetragono basi cum stylophoris articulo apice clavato stigmatoso.

HAB. Randaisan, leg. N. KONISHI et S. NAKAI, Aug. 1909 (typus! fl.).

Very remarkable for its anthers which have many small pores arranged in 4-rows.

**Loranthus theifer** HAYATA sp. nov. Frutex ad ramos arboris parasiticus. Rami teretes glabri fusco-purpurascens dense lenticellati, lenticellis minutis latoribus quam longioribus medio impressis fulvis, ramulis ultimis fulvo-cinerascentibus longitudinaliter rugulosis. Folia obovato-spathulata in exsiccato subcoriacea concolora glaberrima fulvo-rubescens 4 cm. longa 12 mm. lata apice perfecte rotundata basi cuneato-attenuata, costis venisque utraque pagine tenuiter elevatis, venis utroque latere costæ 2-3 a costa circ. angulo 30° egressis, margine integra in exsiccato plus minus repandula, venis gracillimis tenuissimis obscuris, venulis haud visis, petiolis 4 mm. longis subcomplanatis glabris intus haud sulcatis. Flores ad latus ramorum pedicellato-fasciculati vel pseudo-umbellati, pedunculis umbellarum 4 mm. longis, pedicellis vel radiis umbellarum 3 mm. longis 4-5 in numero totis sparse pubescentibus: pedicellis apice ad latus singulum 1-bracteatis, bracteis crassiusculis obtuso-triangularibus extus pubescentibus intus glabris margine ciliolatis. Calyx tubuliformis sursum leviter latior deorsum leviter minus latus sursum plus minus urceolatus 3 mm. longus 2 mm. latus apice sub limbo plus minus constrictus extus dense depresseque stellato-tomentosus, limbo  $\frac{1}{3}$  mm. longo margine subintegro vel crosso intus

glabro. Corollæ tubuliformes extus primum pubescentes demum glabratae, tubo  $1\frac{1}{2}$  cm. longo 3–4 mm. lato sursum minus lato deorsum latiore ad basin subito ad 1 mm. contracto, limbo 4-partito, partibus linearibus 6 mm. longis medio minus quam 1 mm. latis apice acuto-obtusis deorsum plus minus dilata-tis utraque pagine glabris valvatis supra basin subito flexis deorsum exteriore reflexis. Stamina 4, filamentis ad basin lobo corollæ affixis complanatis 2 mm. longis glabris  $\frac{1}{2}$  mm. latis intus leviter canaliculatis, antheris linearibus  $2\frac{1}{2}$  mm. longis quam parte libera filamentorum longioribus apice obtusis basi ad fila-mentum abeuntibus minus quam  $\frac{1}{2}$  mm. latis 2-ocularibus. Ovarium inferius apice glabrum stylophoris (vel discis)  $\frac{1}{3}$  mm. longis coronatum, stylo filiformi 2 cm. longo acuto-tetragono apice clavato stigmatoso. Pseudobacca obovoideo-ellipsoidea 7 mm. longa  $3\frac{1}{2}$  mm. lata verrucosa apice cum dentibus calycis et reliquis stylophoris coronata.

HAB. Kōshūn: Shijūkei, leg. S. SASAKI, Feb. 1911, (typus! fl. et fr.); ibi-dem, leg. T. SŌMA, Aprili. 1912, (No. 28).

Near *L. ritozanensis* HAY., but easily separable from it by the much shorter anthers.

### **Pseudixiæ** HAYATA tribus novus Loranthacearum.

Perianthii lobi 3. Stamina 3 lobis perianthii alterna a lobis libera sed se perfecte conjugata. Placenta basalis; embryo-saccus 1 (vel 2?) oblongus haud U-formis.

The new tribus differs from Bifariæ VAN TIEGHEM by the stamens alter-nate with the perianth-lobes, and by the basal placenta and oblong embryosac.

### **Pseudixus** HAYATA.

On *Pseudixus*, a new genus of Loranthaceæ, founded on the well-known and widely distributed species, *Viscum japonicum* THUNB. in Tōkyō Bot. Mag. XXIX. pp. 31–34. *Bifaria* VAN TIEGHEM in Bull. Soc. Bot. Fr. XLIII (1896) p. 173, pro parte.

Perianthii tubus in fl. ♂ brevissimus solidus in fl. ♀ ovario adnatus; limbus 3-partitus, partibus valvatis. Antheræ in fl. ♀ nullæ; in fl. ♂ in centro perianthii sitæ 3 sessiles 2-loculares cum lobis perianthii alternæ a lobis perianthii liberæ sed se undique perfecte connata synandrium formantes;

synandrium ad centrum floris insitum sessile depresso-globosum 3-valvatum vel poro centrali dehiscens. Ovarium in fl. ♂ nullum in fl. ♀ inferum; stigma crassum pulviniforme in summo ovarii sessile. Bacca perianthii lobis adpressis coronata, mesocarpio succulento viscifero. Embryo albumine copioso carnosus inclusus teres.—Suffrutex in arbores parasiticus, ramis oppositis nodosis. Folia ad squamas reducta. Flores ad nodos v. ad apices ramorum glomerati sessiles. Bractea parva pectinato-ciliata. Species unica. India, Malaya, Mauritius, Australia, Polynesia (fide HOOKER), Loo-choo, Bonin, Formosa et Japonia.

The present genus is closely allied to *Bifaria* VAN TIEGHEM in having trimerous flowers and in the shape of the internodes. VAN TIEGHEM does not give any diagnosis of his genus. But, judging from the detailed accounts given by the author of the tribus Bifaricæ, the genus seems to have male flowers with stamens opposite to the perianth-lobes and U-formed embryo-sacs, as is the case with *Korthalsella*. In establishing *Bifaria*, VAN TIEGHEM distinguishes at least as many as 56 species, including *Viscum japonicum* THUNB. on which our genus *Pseudixus* was founded. Although he gives no remark on what species he established his genus *Bifaria*, yet it is very reasonable to think that the latter was founded on a species other than *Viscum japonicum* THUNB. As the latter is not congeneric with other species of *Bifaria*, it should be excluded from the species enumerated by VAN TIEGHEM as belonging to his genus.

***Pseudixus japonicus* HAYATA n. n. (Fig. 64).**

*Viscum moniliforme* (B. C.) WIGHT Ic. Pl. t. 1018.

*Viscum moniliforme* (B. C.) var. *coralioides* WIGHT Ic. Pl. t. 1019.

*Viscum moniliforme* BLUME Fl. Jav. Lor. t. 25.

*Viscum japonicum* THUNB. in Trans. Linn. Soc. II. p. 329; DC. Prodr. IV. p. 283; Hook. f. Fl. Brit. Ind. V. p. 226; FORBES et HEMSL. Ind. Fl. Sin. II. p. 407.

*Viscum articulatum* FRANCH. et SAVAT. Enum Pl. Jap. I. p. 406.

*Bifaria japonica* VAN TIEGHEM in Bull. Soc. Bot. Fr. XLIII. p. 173, (1896).

*Korthalsella japonica* ENGL. in ENGL. u. PRANTL Nat. Pfl.-fam. Nachtr. I. p. 138, (1897); GAMELE in Journ. As. Soc. Beng. LXXV. p. 384 (1914).

Parasitica ad ramos arboris specierum diversarum incola, erecta 5-15 cm. longa ramosissima, ramis oppositis nodosis, internodiis variabilissimis mediocribus 15 mm. longis 4 mm. latis valde complanatis medio 1-costatis obovato-cuneatis efoliatis apice cupuliformiter expantibus, partibus expantibus 1 mm. longis. Flores monœcii ad nodos lateraliter glomeratim siti basi multibracteolati, brac-

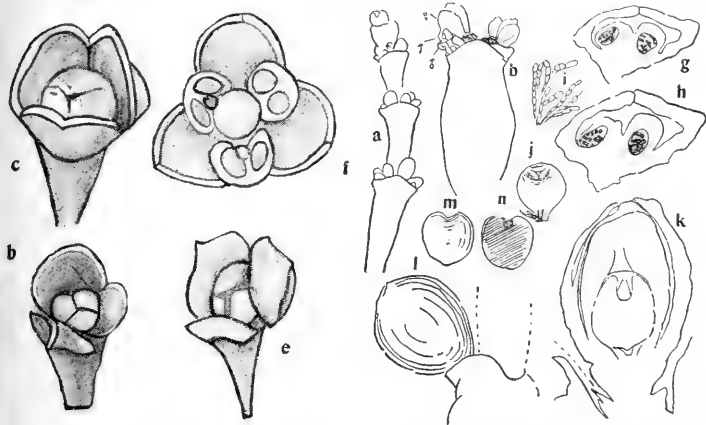


Fig. 64, *Pseudix japonicus* HAYATA; a, a branch; b, male and female flowers on a node; c, d, e, various forms of male flowers; f, perianth-lobes and connate stamens are expanded, to show the relative position of stamens and perianth-lobes; g, h, two consecutive sections of a male flower; i, bracteoles; j, an advanced female flower; k, vertical section of another advanced female flower; l, a fruit; m, a seed; n, vertical section of the same, embryo seen.

teolis ciliiformibus, ciliis multicellularibus  $\frac{1}{3}$  mm. longis apice subclavatis. Fl. ♂ subsessiles vel breve stipitati, stipitibus  $\frac{1}{2}$  mm. longis plus minus gracilibus glabris. Perianthium in alabastro depresso-globosum  $\frac{1}{2}$  mm. in diametro, tubo solido brevissimo, limbo 3-lobato, lobis in flore apertienti reflexo-patentibus late triangularibus  $\frac{1}{2}$  mm. latis  $\frac{1}{3}$  mm. longis apice triangulari-obtusis basi haud contractis latissimis apice reflexo-patentibus basi valde interiore concavis. Syngandrium depresso-globosum  $\frac{1}{4}$  mm. in diametro apice depressum ad centrum poris singulis instructum 6-loculare in maturo 3-valvatum dehiscens. Flores ♀ sessiles; calycis tubus cum ovario adnatus, limbo brevissimo 3-lobato, lobis quam eis floribus ♂ multo minoribus minutissimis  $\frac{1}{8}$  mm. latis  $\frac{1}{20}$  mm. longis late

triangularibus ad apicem ovarii adpressis persistentibus. Pseudobacca obovoidea 2 mm. longa  $1\frac{2}{3}$  mm. lata apice rotundata ad summum lobis perianthii coronata basi cuneato-contracta plus minus complanata. Semina plus minus complanata rotundato-obcordata  $\frac{3}{4}$  mm. longa totiusque lata apice cordato-emarginata basi obtusissima, testa tenuissima membranacea; albumen copiosum; embryo complanato-rotundatus vel teres?

HAB. Formosa: Linkiho, ad *Rhododendrum*, leg. H. INABA, Aug. 1911; Mt. Arisan, inter Suisharyō et Funkiko, ad 3000 ped. alt., ad ramos *Symploci suishariensis* incola; Suisharyō, ad 3000 ped. alt., ad *Osmanthus Matsumurae*, *Adinandrum* et *Theam* aff. *Sasanquam* crescens. Bonin: Mt. Asahiyama, ad ramos *Litsea glauca* crescens. Ogasawara, ad *Sideroxylum ferrugineum*. Loo-choo: ad *Eugenia sinensem*; Kumejima ad *Illicem crenatam*. Japan: Miyajima ad *Illicem pedunculatam*; Kiyodsumi, ad *Cleyra orchnaceam*; Kōdsushima, *Theam japonicam* et *Cinnamomum pedunculatum*; Mt. Shōciyama (Prov. Awa), ad *Symplocum myrtifolium*; Tsushima, ad *Cinnamomum pedunculatum* et *Ligustrum japonicum*.

It is very probable that *Viscum moniliforme* BLUME Fl. Jav. Lor. t. 25 is referable to this *Pseudixus* or *Bifaria*, as is seen from the ciliate or pectinate bracts and clustered female flowers. HOOKER is not justified to treat both *Viscum moniliforme* BLUME and *Viscum aphyllum* GRIFF. (Ic. Pl. As. t. 630) as referable to *V. articulatum* BURM. The former two are certainly totally different each other *V. aphyllum* has no ciliate bracts, while *V. moniliforme* has ciliate bracts but no involucre like that of the former. It should be granted that *V. aphyllum* GRIFF. is referable to *V. articulatum* BURM. on account of the involucre, while *V. moniliforme* should be a species closely allied to or identical with *V. japonicum* THUNB. *Viscum articulatum* BENTH. (Fl. Hongk. p. 141) is quite different from *Pseudixus japonicus*. The former has the females "scarcely  $\frac{1}{2}$  line long, nearly globular, and half-buried in the cup-shaped entire bract," while the latter has the flowers quite free from ciliiform bracts.

#### *Viscum* LINN.

***Viscum* (*Aspidixia*) *bongariense* HAYATA sp. nov.** (Fig. 65 et 66). Suffrutex efolius parasiticus suberectus pendulus 30-40 cm. longus basi teres 4 mm. crassus glaber in exsicco rugulosus fulvo-flavescens a basi sursum di-

chotome vel trichotome ramosissimus, ramis medio superioribus complanatis nodosis internodiis circ. 2cm. longis apice 2mm. latis basi  $1\frac{1}{2}$  mm. latis ad latus acutis in sectione lentiformibus glabris longitudinaliter 3-sulcatis elongato-cuneiformibus apice latoribus basi angustioribus. Flores ♂ ad utrumque latus apicis internodii superioris solitariter siti sessiles cum involucro  $1\frac{1}{2}$  mm. longi basi

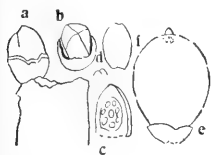


Fig. 65, *Viscum bongariense* HAYATA; a, a male flower on a node; b, the same, seen from a little above; c, a perianth-lobe with a stamen; d, rudimentary ovary; e, a fruit; f, a seed.



Fig. 66, *Viscum bongariense* HAYATA  $\times \frac{3}{4}$ .

utroque latere bracteolis triangularibus  $\frac{1}{3}$  mm. longis instructi. Involucrum crustaceum basi floris situm sub lente botryoideo-tuberculatum ad orem erosum plus minus sub lente setulosum. Perianthium usque ad medium 4-lobatum, lobis triangulari-oblongis  $1\frac{1}{3}$  mm. longis apice obtusis. Stamina 4 sessilia, antheris oblongis minus quam 1 mm. longis  $\frac{1}{2}$  mm. latis dorso cum lobis perianthii connatis intus porosis, poris 10-12. Rudimentum ovarii minutum 2-lobatum. Pseudobacca obovoidea

7 mm. longa  $4\frac{1}{2}$  mm. lata basi involuero persistenti instructa. Semina ellipsoidea 3 mm. longa plus minus complanata.

HAB. Akōchō: Bongarisha, leg. S. SASAKI, Mart. 1910.

Near *V. Querci-Morii* HAY.; but separable from it by the tetragonal male flowers with equal-sized perianth-lobes.

***Viscum* (*Aspidixia*) *diospyrosicolum* HAYATA sp. nov. (Fig. 67-68).**

Parasitica ad ramos *Diospyros* incola 40-50 cm. longa basi subteres a basi dichotome vel trichotome ramosa, internodiis mediis subteretibus vel plus minus complanatis 4-5 cm. longis medio  $1\frac{1}{2}$

mm. latis apice plus minus dilatatis 3 mm. latis deorsum angustioribus sulcatis glabris, internodiis superioribus manifeste complanatis, in sectione lentiformibus, 2 cm. longis medio  $1\frac{1}{4}$  mm. latis. Flores ♀ ad utrumque latus apicis internodiorum superiorum siti bracteolis minutis triangularibus utroque latere instructi basi involuero suffulti cum involuero 1 mm. longi, involuero crustaceo  $\frac{1}{2}$  mm. longo ad orem 2-lobato crassiusculo sub lente botryoido-muricato margine sub microscop-

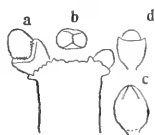


Fig. 67, *Viscum diospyrosicolum* HAYATA; a, a female flower on a node; b, the same, seen from above; c, the same, seen from side, involucre taken off; d, the same, perianth-lobes taken off; stigma seen.

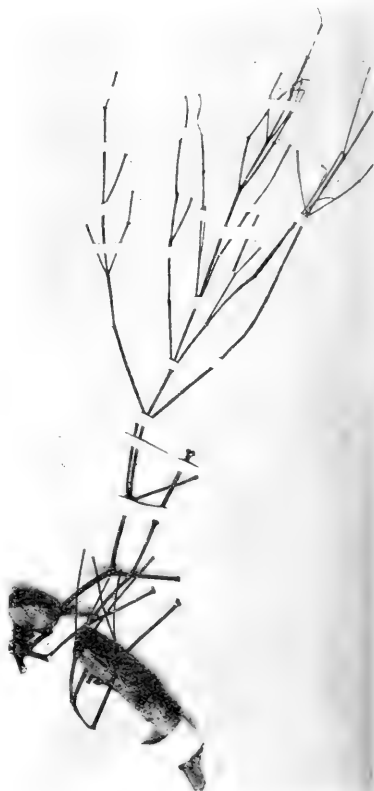


Fig. 68, *Viscum diospyrosicolum* HAYATA  $\times \frac{2}{25}$ .



pio breve pectinato. Calycis tubus cum ovario adnatus complanatus  $\frac{2}{3}$  mm. longus, lobis 4 triangularibus apice acutis vel truncatis; stigma sessile conicum  $\frac{3}{8}$  mm. longum apice obtusum.

HAB. Toroku: Yōshiryō, leg. T. KAWAKAMI et Y. SHIMADA, Oct. 1907, (No. 5747).

The most slender form of *Viscum* found in Formosa. It is very likely an erect plant.

***Viscum* (*Aspidixia*) *filipendulum* HAYATA sp. nov.** (Fig. 69-70). Parasitica 40-50 cm. longa pendula dichotome vel trichotome ramosissima, ramis nodosis patentissimis, internodiis mediis inferioribusque teretibus 2-2 $\frac{1}{2}$  cm. longis 2 mm. in diametro sectionis apice plus minus latioribus basi angustioribus in exsiccatō rugulosis glabris, internodiis superioribus angustioribus complanatis. Flores monœcii. Fl. masculini ad latus nodorum oppositum siti brevissime stipitati, stipitibus  $\frac{1}{2}$  mm. longis perfecte immersis, bracteolis minutis; involuero ad orem bifido margine sub lente setuloso-pectinato. Segmenta calycis 4 extus sub lente papillosa oblonga apice acuta vel obtusa 1 $\frac{2}{3}$  mm. longa  $\frac{2}{3}$  mm. lata, antheris sessilibus ad segmentum calycis adnatis oblongis 1 mm. longis. Flores ♀ ad latus nodorum oppositum siti. Ovarium inferius. Fructus in exsiccatō succino-coloratus oblongus 7 mm. longus 6 mm. latus apice obtusus lobis perianthii 4 triangularibus apice acutis  $\frac{1}{2}$  mm. longis coronatus glaber ad centrum apice apiculato-punctatus.

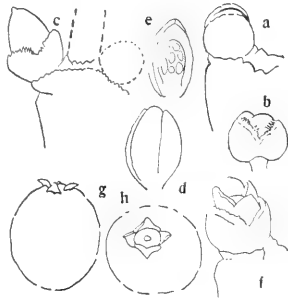


Fig. 69, *Viscum filipendulum* HAYATA; a, a male flower-bud on a node; b, the same, detached; c, a more advanced male flower on a node; d, the same, detached; e, a petal with a stamen; f, a female flower; g, a fruit; h, the same, seen from a little above.

HAB. Kōshūn: Shasensui, leg. T. KAWAKAMI et S. SASAKI, Feb. 1911.

Remarkable for its having persistent calyx-lobes like those of *Pseudixus japonicus*.

***Viscum* (*Euviscum-Trifloræ*) sp.** Folia elliptica 2-3 cm. longa 1 cm. lata apice obtusissima basi cuneata margine integra crassiuscula plana 3-nervia,

nervis spura elevatis subtus haud elevatis, glabra, petiolis subnullis vel brevissimis 1 mm. longis; internodiis teretibus vel plus minus complanatis in exsiccato rugulosis. Flores ♀ ad apicem ramorum ternatis siti. Bacca vel pseudobacca elongato-globosa 7 mm. longa 5 mm. lata utrinque acuta sub lente papillosa apice reliquis calycis lobi haud coronata in exsiccato sucinocolorata apice acuta summo obtusa basi breve stipitiformis laevis. Semina valde complanata quadrangularia 2 mm. lata  $2\frac{1}{2}$  mm. longa ad angulos obtusissima flavescentia laevia.



Fig. 70, *Viscum filipendulum* HAYATA.

HAB. Ritōzan, leg. T. KAWAKAMI.

Somewhat near *Viscum orientale* var. (figured in BLUME Fl. Jav. Lor. t. 25-A), in having quite obtuse 3-nerved leaves; but different from it in having quite entire but not pectinate bracteoles.

***Viscum (Aspidixia) liquidambaricolum* HAYATA sp. nov.** Parasitica ad

ramos *Liquidambar formosance* suberecta a basi dichotome vel trichotome ramosa basi teres crassiuscula 5-7 mm. in diametro nodosa, internodiis mediis superioribusque valde complanatis mediis  $2\frac{1}{2}$ -3 cm. longis  $3\frac{1}{2}$  mm. latis apice latoribus basi angustioribus multi-costulatis et multi-sulcatis. Flores monœcii ad nodos glomeratim siti. Fl. ♂ sessiles cum involucro  $1\frac{2}{3}$  mm. longi totiusque

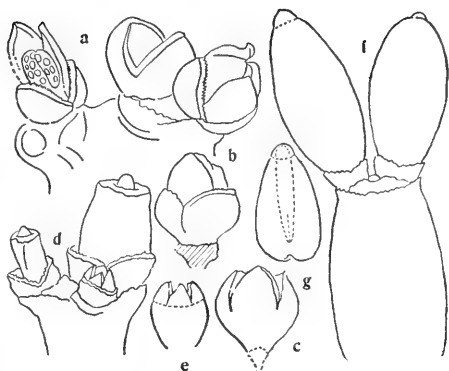


Fig. 71, *Viscum liquidambaricolum* HAYATA; a, male flowers on a node; b, a male flower in the involucre; c, the same, detached from the involucre; d, female flowers; e, a female flower, detached; f, fruits on a node; g, a seed with embryo.

lati, involucro  $1\frac{1}{3}$  mm. longo ad orem 2-lobato crustaceo. Perianthium  $1\frac{1}{3}$  mm. longum totiusque latum apice ad medium 4-lobatum, lobis oblongo-triangularibus, antheris cum lobis connatis. Flores ♀ cum fl. ♂ conformes, sed lobis

calycis minoribus  $\frac{1}{2}$  mm. longis triangularibus. Ovarium apice truncatum ad centrum stigmatē coniformi coronatum. Pseudobacca ellipsoidea 6 mm. longa 4 mm. lata apice obtusissima, stigmatē coniformi obtuso coronata. Pseudosemina complanato-ovoidea basi latiora leviter 2-lobata 5 mm. longa 2 mm. lata; embryo teres.

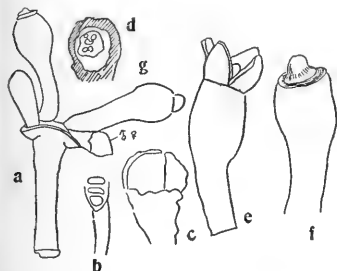


Fig. 73, *Viscum multinerve* HAYATA; a, flowers on a node, seen from front; b, a node, seen from side, showing the scars of flowers; c, a male flower; d, a perianth-lobe, with a stamen; e, a female flower; f, the same, lobes taken off, showing stigma.

HAB. Nanto: Taishō, leg. N. KONISHI (No. 97); HAINAN, leg. N. KONISHI, JUNI. 1909 (No. 38); Shūshū, leg. H. INABA, JUL. 1911; Shashi, NOV., 1912, leg. W. R. PRICE (No. 185);

Shizangan, leg. T. MAKINO. Nov., 1896.

Vary near *Viscum articulatum* BURM. (HOOKER Fl. Brit. Ind. V. p. 226; *V. aphyllum* GRIFF. Ic. Pl. Asiat. tt. 630, 632). I should have rather referred this new species to *V. articulatum* of BURMAN, had the fact, that this mistletoe is always found on *Liquidambar formosana*, but never on any other tree, not made me hesitate to do so.

**Viscum** (*Botryoviscum* - *Plæonixia* - *Mesogyneum*) **multinerve** HAYATA. (Fig. 73) n. n. *Viscum orientale* WILLD. var. *multinerve* HAYATA Fl. Mont. Formos. p. 192.

**Viscum** (*Aspidixia*) **Querci-Morii** HAYATA sp. nov. (Tab. XIII. et Fig. 74). Suffrutex ad ramos

*Querci Morii* parasiticus 40-50 cm. longus pendulus vel suberectus efoliatus basi teres dichotome vel trichotome ramosus nodosus, internodiis mediis superioribusque valde complanatis, mediis 3 cm. longis elongato-cuneiformibus apice 3 mm. latis basi  $1\frac{1}{2}$  mm. latis in sectione complanatissime lentiformibus prope medium 3-costulatis. Flores ♂ ad nodos oppositum siti  $1\frac{1}{2}$  mm. longi subcomplanati, segmentis calycis ad medium connatis basi involuero suffulti. Fl. ♀ 2 mm. longi



Fig. 72, *Viscum liquidambaricolum* HAYATA.

involucro crustaceo ad medium involuti; calycis tubus complantus  $1\frac{1}{3}$  mm. longus tubuliformis, segmentis 4 triangularibus  $\frac{2}{3}$  mm. longis totiusque latis, stigmatibus sessilibus late conicis. Pseudobacca ellipsoidea  $7\frac{1}{2}$  mm. longa 4 mm. lata apice obtusa ad summum truncata ad centrum minute obtuso-apiculata. Embryo fusiforme linearis  $4\frac{1}{2}$  mm. longus.



Fig. 74, *Viscum Querci-Morii* HAYATA  $\times \frac{1}{2}$ .

HAB. Mt. Arisan, Nimandaira; ad ramos *Querci Morii* incola, leg. B. HAYATA, Mart. 1914.

Near *V. bongariense* HAY.; but separable from it by the more slender

branches and the male flowers being more or less complanate.

## Balanophoreæ.

### *Balanophora* FORST.

***Balanophora morrisonicola*** HAYATA sp. nov. Parasitica. Planta 12-15 cm. alta simplex diœcia cylindrico-teres. Volva subglobosa fulvescens. Scapi ♂ rubescentes cylindrico-teretes cum spicis circ. 15 cm. longi, pedunculo 7 cm. longo 8 mm. in diametro basi 2-3-squamato; spica floris ♂ rubescens cylindrica circ. 10 cm. longa 2 cm. lata dense florata. Fl. ♂: majusculi apertientes plus quam 1 cm. in diametro valde depressi sessiles  $1\frac{1}{2}$  cm. in diametro transverso  $1\frac{1}{3}$  cm. in diametro verticali, lobis perianthii inæqualibus 4-6 late rotundatis vel quadrangularibus; anthere perfecte connatæ, loculis numerosis plus quam 100 in flore singulo. Fl. ♀: dense spicati, spicis rubescentibus ovato-ellipsoideis circ. 7 cm. longis 32 mm. latis apice obtusissimis, facie corporibus dense dispositis, corporibus clavato-cubiformibus  $1\frac{1}{2}$  mm. longis 1 mm. latis apice truncatis basi stipitiformibus basi ovarii numerosis insitis.

HAB. Mt. Morrison, leg. T. KAWAKAMI et S. SASAKI.

Near *Balanophora formosana* HAYATA, but distinguishable from it by the ovoid or ellipsoidal spikes of female plants and by the very much larger male flowers with very much more numerous anther-cells.

***Balanophora mutinoides*** HAYATA Ic. Pl. Formos. III. p. 168, t. 31.

*Balanophora Kawakamii*.

HAB. Mt. Arisan: Nimandaira, leg. B. HAYATA, Mart. 1914.

*B. mutinoides*, *B. Kawakamii* are two names given to one and the same species by two different authors. One name should be rendered a synonym of the other. Male flowers cream-yellow, female flowers light reddish-purple.

## Euphorbiaceæ.

### *Cyclostemon* BLUME.

***Cyclostemon karapinense*** HAYATA sp. nov. Arborescens vel frutex. Rami graciles cinerascens longitudinaliter rugulosi, cortice plus minus fissio, lenticellis minutis haud distinctis, ramulis foliiferis gracillimis in exsiccatto fusco-nigricantibus paucissime hirsutis subrectis. Folia alterna remote disposita

petiolata oblonga obovato-vel ovato-oblonga circ. 8 cm. longa  $3\frac{1}{2}$  cm. lata apice caudato-acuminata, caudis circ. 7 mm. longis, ad summum obtusa margine integra basi plus minus oblique latere uno cuneato-acuta latere uno obtusa in exsiccato chartacea utraque pagine glabra, costis venis venulis reticulis venularum utraque pagine tenuiter elevatis distincte visis, venis lateralibus primariis utroque latere costæ 6-7 basi a costa angulo  $60^\circ$  egressis basi rectis sursum arcuatis, petiolis 3-5 mm. longis hirsutis intus sulcatis. Flores ignoti. Fructus axillares sub-penduli solitarii, pedunculis circ.  $2\frac{1}{2}$  cm. longis gracilibus apice plus minus dilatatis. Capsula præmatura carnosa globosa 13 mm. longa totiusque lata viridis 3-locularis, loculis 1-spermis.

HAB. Mt. Arisan, inter Karapin et Suisharyō, leg. B. HAYATA et I. TANAKA, Aprili. 1914.

Differs from all the species of this genus found in the Philippines, as is suggested by. Mr. E. D. MERRILL of Manila.

*Mercurialis* LINN.

***Mercurialis transmorrisonensis***

HAYATA sp. nov. (Fig. 75). Herba basi lignosa prostrata ad nodos radificera et ramosa a basi sursum ascendente-erecta eramosa perennis; caules simplices erecti 40-50 cm. longi glabri sub-tetragoni nodosi, internodiis 5-15 cm. longis. Folia omnia caulina opposita lanceolata ovato-lanceolata membranacea  $4\frac{1}{2}$ -7 cm. longa  $1\frac{1}{2}$ -2 cm. lata apice acuminata ad summum obtusa ad centrum summorum acuta basi obtusa acuta margine serrulata ciliolata, serrulis ascendentibus apice unciformibus interiore recurvis, inferioribus 2 mm. longis, in acumine basique integra supra strigoso-pubescentia subtus sub-

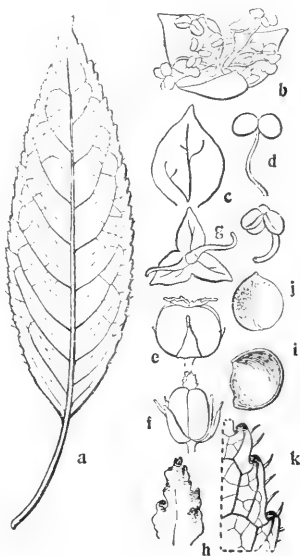


Fig. 75, *Mercurialis transmorrisonensis* HAYATA.; a, a leaf, natural size; b, a male flower; c, a sepal; d, a stamen; e, a female flower; f, the same, seen from side; g, the same, ovary taken off, showing staminodes; h, apical portion of stigma; i, a valve of a capsule; j, a seed; k, margin of a leaf.

glabra vel sparsissime pubescentia, costis venisque utraque tenuissime elevatis, costa complanata, venis primariis lateralibus utroque latere costæ 7-10 tenuissimis prope marginem evanescentibus ad apicem serrarum haud attingentibus, petiolis laminam  $\frac{1}{4}$ -plo æquantibus apice glandulis minutis globuli-formibus 3-4 instructis basi leviter dilatatis 1-2 cm. longis, stipulis lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis apice acutis vel obtusis basi latere singulo auriculatis glabris. Flores monœcii. Recemi floris axillares ad axillas solitarii valde longiores 10-15 cm. longi longe pedunculati, pedunculis brevioribus vel longioribus, floribus masculinis et fœmineis mixtis secus rhachin racemorum glomeratim dispositis, glomeris 3-5-floratis alternatim dispositis a se 1 cm. remotis, bractea sub glomeris singulis una oblongo-triangulari 1 mm. longa apice obtusa glabra. Fl. ♂ : subsessiles vel brevissime pedicellati sub calyce articulati. Sepala 3 æqualia ovato-oblonga  $1\frac{1}{2}$  mm. longa 1 mm. lata apice acuta basi leviter contracta tenuissima glabra. Stamina circ. 10 ad centrum floris congesta, filamentis glabris crispatis longe exsertis 2 mm. longis, antheris reniformibus, loculis late globosis divaricatissimis. Fl. ♀ breve pedicellati, pedicellis  $\frac{1}{2}$  mm. longis apice cum calyce articulatis. Sepala ut fl. ♂. Staminodia 2 linearia complanata 1 mm. longa  $\frac{1}{3}$  mm. lata glabra, antheris ad nullum reductis. Ovarium 2-loculare reniforme 1 mm. latum  $\frac{1}{2}$  mm. longum glabrum sublaeve fusco-rubescens, stigmate sessili 2-partito, partibus patentissimis liberis ovario haud contactis fusco-rubescens lanceolatis  $\frac{1}{2}$  mm. longis apice acuminatis; ovulis in loculo singulo solitariis. Capsula 2-cocca, coccis 3 mm. longis viridibus facie lævibus haud rugulosis; semina subglobosa 2 mm. in diametro, testa rubescens tenuissime impresso-punctata.

*Mercurialis leiocarpa* HAYATA Fl. Mont. Formos. p. 194 (non SIEB. et ZUCC.).

HAB. Mt. Arisan, Tōzan, ad 8000 ped. alt., Aprili. 1912, leg. B. HAYATA.

Very near *Mercurialis leiocarpa* SIEB. et ZUCC., but differs from it in having the less verrucose ovary with the much spreading stigmata and the less verrucose or nearly smooth capsules. The distinction of this plant from *M. leiocarpa* is even more clear in the living specimens. The leaves of the new species are pale green and of ordinary luster, while those of the Japanese are deep green, shining and almost opalescent. The former has the ovate lanceolate leaves which are usually obtuse at the base, while the latter has the ovate oblong ones which are usually rounded at the base.



## Urticaceæ.

*Ulmus* LINN.***Ulmus Uyematsui* HAYATA** (Fig. 76). Ic. Pl. Formos. III. p. 174, t. 32.

Descriptio auctata: Samara matura obcordata tenuissima membranacea radiatim reticulatimque nervosa glabra cum stipite 2 mm. longo 2 cm. longa 13 mm.—15 mm. lata apice obcordata 2-lobata basi cuneato-acuminata ad stipitem 2 mm. longum abeuns facie toto glabra sed ad sinus cordis apicalem margine interiore rubro-hirsuta utraque facie stellato-punctata, venis distinctis elevatis radiatim reticulatis. Semina ovata valde complanata apice acuta basi rotundata  $3\frac{1}{2}$  mm. longa 2 mm. lata ad centrum samare locata, testa membranacea tenuissima; albumen nullum; embryo amplus, radicula supra minuta  $\frac{1}{3}$  mm. longa totiusque lata apice obtusa basi latiora, cotyledonibus amplis obovato-obtriangularibus  $2\frac{1}{3}$  mm. longis  $1\frac{3}{4}$  mm. latis apice rotundatis versus centrum apicis truncatis basi obtusis crassiusculis.



Fig. 76, *Ulmus Uyematsui* HAYATA; a, a fruit; b, a seed; c, an embryo; d, the same, seen from side; all figures are more or less magnified.

HAB. Mt. Arisan: Heishana, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

## Salicineæ.

*Salix* LINN.

***Salix Doii* HAYATA** sp. nov. Frutex? Rami teretes in exsiccato fuscentes longitudinaliter rugulosi glabri, ramulis hornotinis leviter pubescentibus foliiferis. Folia hornotina lanceolata  $3\frac{1}{2}$  cm. longa 11 mm. lata apice obtusa ad centrum minute mucronata basi obtusissima margine integra supra primum ad costam venasque tenuiter sericeo-pubescentia subtus tenuiter sericeo-pubescentia utraque pagine demum glabrata, petiolis 4 mm. longis pubescentibus, stipulis minutis palmiformibus  $\frac{1}{3}$  mm. longis totiusque latis margine glandulis 5-6 globosis instructis. Amenta ♂ ignota. Amenta ♀ ad ramulos annotinos lateraliter sita vel ad apicem ramulorum hornotinorum terminalia basi cataphyllis 1-2 elongato-

oblongis 1 cm. longis  $3\frac{1}{2}$  mm. latis apice obtusis basi ad insertionem 1 mm. latis margine interiore convolutis intus glaberrimis extus dense sericeo-villosis instructa fere sessilia vel breve pedunculata  $3\frac{1}{2}$  cm. longa cum floribus 1 cm. lata dense florifera, rhachibus hirsutis. Fl. ♀ : bracteis oblongis  $1\frac{1}{2}$  mm. longis  $\frac{2}{3}$  mm. latis apice obtusissimis utraque pagine hirsutis. Discus solitarius ovoideus vel quadrangularis dorso complanatus apice hirsutus. Ovarium elongato-ovato-ampulliforme  $2\frac{1}{2}$  mm. longum 1 mm. latum dense sericeo-tomentosum apice rostratum basi obtusissimum intus fundo hirsutum stipitatum, stipitibus  $1\frac{1}{2}$  mm. longis hirsutis, stigmate terminali sessili 2-lobato, lobis apice ovarii firme contactis, ovulis circ. 6 erectis.

HAB. Rinkihō leg. T. DOI, 1912.

Near *Salix Morii* HAYATA, but separable from it by the much smaller catkins and far less hairy leaves.

**Salix fulvopubescens** HAYATA sp. nov. Frutex; rami fuscentes longitudinaliter rugulosi lenticellis minutis sparsissime conspersi; ramuli foliiferi haud hirsuti glabri. Folia alterna oblongo-lanceolata vel lanceolata mediocria 9-10 cm. longa 3 cm. lata apice acuminata brevissime mucronata basi obtusa interdum obliqua margine integra supra subglabra vel glabra subtus glaucissima tenuiter fulvo-pubescentia, costa utraque pagine elevata subtus distincte castaneo-colorata, venis lateralibus primariis utroque latere costæ circ. 12, venulis reticulatis utraque pagine tenuissime elevatis, petiolis 13 mm. longis tenuiter pubescentibus, stipulis minutis ovatis  $\frac{2}{3}$  mm. longis  $\frac{1}{2}$  mm. latis crassiusculis margine glandulis globosis 4-5 instructis. Amenta ♂ non visa. Amenta ♀  $3\frac{1}{2}$  cm. longa cum floribus 5 mm. lata ad ramulos brevissimos hortorios terminalia vel ad latus rami annotini lateralia; rhachis hirsuta, bracteis triangulari-linearibus 2 mm. longis  $\frac{2}{3}$  mm. latis basi hirsutis apice obtusis; glandulis cubiformibus  $\frac{1}{3}$  mm. in diametro basi hirsutis cæterum glabris rubescentibus. Ovarium ovoideo-fusiforme basi excepto glabrum versus apicem attenuatum basi obtusum stipitatum, stipitibus 1 mm. longis hirsutis, stigmate sessili 2- vel 4-lobato. Amenta fructifera subsessilia ascendentia vel subnutantia cylindrica 8 cm. longa cum fructibus  $1\frac{1}{2}$  cm. lata. Capsula 7 mm. longa glabra leviter castanea.

HAB. Mt. Arisan : Banzeisan, leg. S. SASAKI, Mai. 1913.

Near *S. transarisanensis* HAYATA, but distinguishable from it by the leaves

which are glaucous beneath and are thinly covered by brownish sericeous hairs.

**Salix Morii** HAYATA sp. nov. Frutex; rami teretes leviter longitudinaliter rugulosi fulvo-fuscentes, ramulis breve villosis. Folia adulta non visa, juvenia oblonga  $1\frac{1}{2}$  cm. longa 7 mm. lata apice obtusa basi obtusissima supra minus subtus plus densissime sericeo-villosa margine integra, petiolis 2 mm. longis densissime sericeo-villosis, stipulis minutis  $\frac{1}{2}$  mm. longis quadrangulati-formibus intus glabris extus sericeo-tomentosis. Amenta masculina non visa. Amenta feminea cylindrica subnutantia 3 cm. longa cum floribus 8 mm. longa subsessilia dense florifera. Fl. ♀: bractea oblonga 1 mm. longa  $\frac{1}{2}$  mm. lata apice truncata apice extus intusque barbata. Discus minutus solitarius. Ovarium elongato-ovato-fusiforme apice attenuatum basi obtusissimum 4 mm. longum 1 mm. latum hirsutum apice ad summum subito contractum basi stipitatum, stipitibus 1 mm. longis hirsutis; stylus brevissimus  $\frac{1}{4}$  mm. longus apice digitatim 4-lobatus; ovarium intus fundo dense longeque barbatum. Amenta fructifera 8 cm. longa cum fructu  $1\frac{1}{2}$  cm. lata. Capsula matura 5 mm. longa  $1\frac{3}{4}$  mm. lata ovato-fusiformis hirsuta fulvo-rubescens.

HAB. Tokunranki, leg. U. MORI, Aprili. 1910 (fl. ♀).

Somewhat comparable to *S. gracilistyla* Miq., but widely different from it in having far less villose carpels.

**Salix transarisanensis** HAYATA sp. nov. (Tab. XIV.). Frutex: rami et ramuli in exsiccato fusco-nigricantes plus minus longitudinaliter rugosi. Folia in magnitudine variabilissima in specimine florifero minora membranacea oblongo-lanceolata 23 mm. longa 8 mm. lata apice acuta basi obtusa utraque pagine supra minus subtus plus sericeo-pubescentia margine integerrima membranacea, petiolis 3–4 mm. longis dense pubescentibus, stipulis minutis  $\infty$  digiti-formibus  $\frac{1}{4}$  mm. longis teretibus caducissimis. Gemma foliifera cataphyllis 2–3 obtecta, cataphyllis infimis latissimis 3 mm. longis superioribus longioribus 6 mm. longis obovatis 3 mm. latis apice lobulatis basi late cuneatis intus glabris extus sericeis, intimis longissimis obovato-oblongis 8 mm. longis 3–4 mm. latis apice obtusissimis integris extus dense hirsutis intus glabris. Amentum ♂ cylindricum cum pedunculis 4 cm. longum 4 mm. latum apice obtusum dense floriferum, pedunculis 3–4 mm. longis cum rhachibus dense hirsutis. Fl. ♂: unibracteati, bracteis elliptico-oblongis 1 mm. longis  $\frac{2}{3}$  mm. latis apice obtusis-

simis rotundatis integris extus convexis dense barbatis intus concavis sparse barbatis vel subglabris. Discus e squama una postica crassiuscula quadranguliformi  $\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata apice impressa. Stamina 2 distincta, filamentis longe filiformibus 5 mm. longis basi barbatis sursum glabratiss, antheris oblongis  $\frac{2}{3}$  mm. longis  $\frac{1}{2}$  mm. latis fere basi-fixis apice obtusis basi emarginatis. Rudimentum ovarii teres minutum  $\frac{1}{3}$  mm. longum. Amentum fl. ♀: cylindricum erectum cum pedunculo 4 cm. longum cum carpellis 8 mm. latum dense floriferum. Fl. ♀: unibracteati, bracteis  $1\frac{1}{3}$  mm. longis  $\frac{2}{3}$  mm. latis apice obtusis intus concavis extus convexis intus sub-glabris extus barbatis apice obtusis. Discus e squama carnea rotundato-quadranguliformi apice emarginata vel truncata  $\frac{1}{2}$  mm. longa totiusque lata. Carpella stipitata ovoideo-fusiformia basi obtusa apice gradatim attenuata apice ad stigmata abeuntia sub apice subito reflexo-recurva vel subrecta plus minus recurvata, stigmatibus plus minus dilatatis 4-lobatis, lobis erectis oblongo-triangularibus  $\frac{1}{3}$  mm. longis; carpella apice usque ad basin glabra basi minus 1 mm. lata, stipitibus  $1-1\frac{1}{2}$  mm. longis dense hirsutis, ovulis ascendentibus anatropis basi pulvinis suffultis numerosis, placentis hirsutis.


HAB. Mt. Arisan: Tōzan, leg. B. HAYATA et TAKEO ITō, Mart. 1914.

I can not yet find any species allied to the present *Salix*. There is surely nothing like this in the Japanese flora.

## Coniferæ.

### *Pseudotsuga* CARR.

**Pseudotsuga Wilsoniana** HAYATA sp. nov. (Tab. XV.) Arbor. ramuli (annotini) cinerascens longitudinaliter rugulosi haud lenticellati haud fissi haud crosi, ramuli hornotini fusco-castanei puberuli inter pulvinos sulcati. Gemma oblonga obtusa, perulis castaneis margine distincte ciliatis. Folia linearia 18 mm. longa  $1\frac{1}{2}-1\frac{1}{3}$  mm. lata apice retusa vel breve 2-lobata basi subito attenuata ad petiolum  $\frac{1}{2}$  mm. longum abeuntia supra nitida ad costam sulcata subtus subglauca ad costam elevata ad marginem deorsum recurva. Strobilus maturus ovoideo-ellipticus sessilis ad ramos lateraliter situs 6 cm. longus 4 cm. latus apice obtusus bracteis et squamis seminiferis spiraliter dispositis, bracteis mediis linearibus 22 mm. longis 5 mm. latis a basi usque ad apicem fere

æquilatis prope apicem subito deorsum flexis, partibus flexis 7 mm. longis apice emarginatis vel sagittato-emarginatis ad centrum apicis cuspidatis, cuspidibus 2 mm. longis 1 mm. latis acutis fusco-castaneis; squamis seminiferis mediis obtriangularibus  $2\frac{1}{2}$  cm. longis  $3\frac{1}{2}$  cm. latis apice latissimis late  - formiter rotundatis basi triangulari-obtusis lignosis extus convexo-recurvis intus concavo-recurvis margine subintegris vel plus minus erosus (ad partem latissimam marginalem tenuissimis) fusco-castaneis. Semina cum alis sub-semi-oblonga 2 cm. longa 8-9 mm. lata apice obtusissima vel subrotundata basi rotundato-acuta et oblique breve acuta, latere interiore minus recurva, latere exteriori plus recurva, pagine interiore ad basin alarum fulvo-pubescentia cæterum glabra, pagine exteriori toto glabra.

*Pseudotsuga japonica* HAYATA (non SHIRASAWA) in MATSUM. et HAYATA Enum. Pl. Formos. p. 400; HAYATA Fl. Mont. Formos. p. 223.

HAB. Mt. Morrison, ad 9000 ped. alt., leg. U. MORI, Dec. 1908 (fr.).

This new douglasfir was formerly regarded by several botanists and also by myself as identical with the Japanese species, *Pseudotsuga japonica* (SHIRASAWA). The distinction between the former and the latter was recently suggested by Mr. E. H. WILSON of the Arnold arboretum, who was at that time devoting himself to the study and collection of the Japanese conifers. After a careful observation on the Japanese species at the native places, the said gentleman examined attentively the Formosan plant in our herbarium. The points of distinction between the two species indicated by him are, first of all, the dark chestnut-coloured shoots on the Formosan conifer and the pale yellowish shoot on the Japanese; secondly the buds of the former are elliptical and obtuse at the apex and the bud-scales are conspicuously ciliate, while those of the latter are more or less cylindrical and acute at the apex and the bud-scales are not at all or very faintly ciliate; in the third place, the shoots of the Formosan fir are thinly clothed with brownish hairs, but those of the Japanese are perfectly glabrous; in the fourth place, the seeds of the new species are (wings being taken together) much larger and the wings are more or less rounded at both apex and base, while those of the Japanese are smaller, and the wings are more or less cuneately obtuse at both ends; and finally the cones of the former are a little larger, usually  $4\frac{1}{2}$ -6 cm. in length, while those of the latter are usually

4cm. long, and even the largest does not exceed 5cm. in length. In addition to these differences above stated, I may here mention a few more points of distinction between the two species, viz:— in the Formosan plant, the bark of the branches of the last year are longitudinally wrinkled but neither at all cleft nor broken, while in the Japanese they are less wrinkled but always broken at the edge of the wrinkles; seeds of the former are thinly hairy at the base of the wings on the inner surface, while those of the latter are quite glabrous; and finally, bract-scales are narrower in our species, while they are wider in the Japanese. All these differences, when taken together, make it indisputable to regard our conifer as a species quite distinct from the Japanese congener. The new species is named after Mr. E. H. WILSON whose field knowledge on plants is really extensive and with whom we had many interesting discussions during his stay in Japan<sup>1</sup>.


**Tsuga formosana** HAYATA Fl. Mont. Formos. p. 222. Descriptio auctata: Fl. ♂ versus apicem ramulorum axillares vel terminales globoso-oblongi 5 mm. longi 4 mm. lati apice rotundati basi globosi breve stipitati multibracteati, bracteis basi stipitium multi-seriatim dispositis extimis costato-triangularibus  $\frac{2}{3}$  mm. longis crassiusculis castaneis, interioribus gradatim majoribus gradatim tenuioribus, intimis obovato-spathulatis 5 mm. longis apice rotundatis truncatis fissis basi cuneato-angustatis tenuissimis haud coloratis hyalinis, pericellis supra partem bracteiferam 1 mm. exsertis subpallidis glabris. Stamina circ. 50 spiraliter circa rhachin disposita, filamentis glabris brevibus  $\frac{1}{2}$ – $\frac{1}{4}$  mm. longis mediis a rhachibus angulo recto egressis, superioribus angulo acuto, inferioribus angulo obtuso egressis, antheris cum rhachide paralleliter dispositis et a filamentis angulo recto egressis 2-ocularibus obcordatis  $1\frac{1}{2}$  mm. latis minus longis apice ad centrum sinus cordis cuspidatis, cuspidibus triangularibus  $\frac{1}{2}$  mm. longis facie laevibus subrugulosis interiore dehiscentibus facie fusco-castaneis.

---

1). After completing this manuscript, I am informed by Mr. WILSON that a species of *Pseudotsuga*, called *P. sinensis* DODE, is published in Bull. Soc. Dendr. France (1912) p. 58, and in Mitt. Deutsch. Dendr. Ges. XXI. (1912) p. 387. Whether my plant is identical with DODE's species or not, remains as yet questionable. Very probably ours may be different from the Chinese species.

HAB. montibus alpinis Formosæ, leg. S. SASAKI.

*Cunninghamia* R. BR.

**Cunninghamia Kawakamii** HAYATA sp. nov. (Tab. XVI). Arbor; rami teretes, foliis spiraliter dispositis. Folia rami vetusti subradiatim plus minus dorsi-ventraliter disposita sessilia lineari-lanceolata 2 cm. longa  $2\frac{1}{2}$  mm. lata apice acuta basi haud contracta plus minus decurrentia, supra nitida inter costas et marginem sulcis stomatiferis instructa, sulcis angustissimis, subtus costis marginibus exceptis glauca stomatifera. Folia ad ramulos hornotinos spiraliter disposita sed tortione quasidisticha quam iis ramuli vetusti plus minus longiora. Gemma depressoglobosa. Strobilus perfecte maturus conico-ovoides  $2\frac{1}{2}$  cm. longus 2 cm. latus apice conico-obtusius basi ovoideo-rotundatus, squamis seminiferis spiraliter dispositis, mediis -formibus 1 cm. longis 8-9 mm. latis basi unguiformibus, partibus unguiculatis 3 mm. longis sursum 5 mm. latis, partibus laminiiformibus 6 mm. longis 8-9 mm. latis apice breve cuspidato-apiculato acutis basi latissimis abrupte ad partem unguiculiformem abeuntibus extus valde convexis haud carinatis intus valde concavis margine integris crassiusculis lignosis intus prope medium vel prope basin laminae squamulis secundariis 3 instructis, squamulis 1 mm. longis  $2\frac{1}{2}$  mm. latis margine sub lente setuloso-crenulatis dorso squama firme affixis glabris. Semina 3, ad squamarum basin affixa reversa libera valde complanata, (testa coriacea), ala anguste cincta, cum alis elliptica vel rotundato-elliptica  $4\frac{1}{2}$  mm. longa 3-4 mm. lata. Embryo medio situs teres 2 mm. longus  $\frac{3}{4}$  mm. indiametro, cotyledonibus 2 oblongis apice truncatis  $\frac{3}{4}$  mm. longis  $\frac{3}{4}$  mm. latis, cum radícula æquilatis, testa seminis fusco-rubescens.

HAB. Rinkihō, Kyōshiryō, ad 2000 ped. alt., Dec. 1913, leg. T. KAWAKAMI.

This new *Cunninghamia* is in every respect just intermediate between *C. sinensis* (= *C. lanceolata* HOOKER) and *C. Konishii*; the forms of the leaves, cones, scales, seeds and all others of the present species are just intermediate between the other two. It is distinguishable from *C. sinensis* in the shorter less patent and acuter leaves, in the smaller cones with the entire shorter more rounded smaller scales and in the smaller seeds. It is at the same time separable from *C. Konishii* by the longer acuter more patent leaves and in the larger cones with the less broad scales and in the larger seeds. The new plant is, though it is hard to say definitely, a little nearer to *C. sinensis* than to

*C. Konishii*. According to Mr. T. KAWAKAMI, the trunk is nearly fifty feet tall, and about four feet in girth.

## Hydrocharideæ.

### *Blyxa* THOU.

***Blyxa* (*Diplosiphon*) *ecaudata* HAYATA** sp. nov. (Fig. 77, c-f.) Planta in aqua immersa acaulis. Folia omnia radicalia fasciculatim disposita lanceolata circ. 6 cm. longa 4 mm. lata apice acuminata vel acuminatissima basi æquilata haud attenuata tenuissime membranacea. Scapi erecti apice uniflorati floribus exceptis 1-2 cm. longi, cum floribus circ. 10 cm. longi folia superantes. Spatha ad apicem scapi sita fructifera cylindracea 3 cm. longa  $1\frac{2}{3}$  mm. lata apice attenuata breviter 2-lobata basi obtusa fructus perfecte includens et eum superans glabra utroque latere tenuiter costata. Flores apertientes ignoti. Flores post anthesin vel fructiferi: calycis tubo (ovario excepto) circ. 4 cm. longo circ. 1 mm. lato, lobis 3 linearibus 5 mm. longis  $\frac{2}{3}$  mm. latis apice obtusis. Petala 3? post anthesin evanescentia. Fructus lineari-cylindricus quam spatha brevior 2-2 $\frac{1}{3}$  cm. longus  $1\frac{1}{2}$  mm. latus, testa tenuiter membranacea haud costata. Semina ellipsoidea 1 mm. longa vel longiora latere uno costata paucissime muricata, testa crustacea, albumen copiosum.

HAB. Hokuto, leg. Y. SHIMADA, Oct. 1915 (No. 16, a).

Near *Blyxa ceratosperma* MAX.; but differs from it by the much narrower fruits with the less muricate seeds.

***Blyxa* (*Diplosiphon*) *lævissima* HAYATA** sp. nov. (Fig. 77, a and b). Herba aquatica, caulis 15-20 cm. longus 1 mm. latus tenuissimus. Folia alterna linearia circ. 3 cm. longa  $1\frac{1}{2}$  mm. lata apice acuminatissima 1-nervia basi sessilia haud contracta

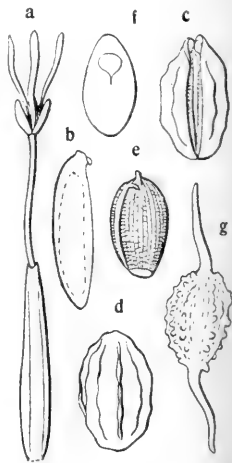


Fig. 77; a, a flower of *Blyxa lævissima* HAYATA  $\times 3$ ; b, a seed of the same species  $\times 15$ ; c, and d, seeds of *Blyxa ecaudata* HAYATA, seen from different sides  $\times 15$ ; e, the same, seed coat taken off  $\times 15$ ; f, albumen, detached from the same seed  $\times 15$ ; g, a seed of *Blyxa Shimadai* HAYATA  $\times 15$ .



sed caulem amplexantia. Spatha sessilis vel brevissime pedunculata cylindrica 12 mm. longa  $1\frac{1}{2}$  mm. lata apice brevissima 2-lobata basi obtusa utroque latere tenuissime costata. Calycis tubus (ovario excepto) filiformis 1-2 cm. longus  $\frac{1}{2}$  mm. latus, lobis 3 oblongo-linearibus 2 mm. longis  $\frac{1}{2}$  mm. latis apice obtusis basi haud contractis. Petala 3 linearia 6 mm. longa  $\frac{1}{2}$  mm. lata apice acuto-obtusa calycis lobis  $2\frac{1}{2}$ -plo longiora. Stamina 3,  $1\frac{1}{2}$  mm. longa calycis lobis breviora. Styli 3 staminibus aequilongi basi coaliti lineares apice obtusi. Ovarium cylindricum 8 mm. longum 1 mm. latum. Fructus cylindricus a spatha ad 5 mm. exsertus, testa tenuissime membranacea. Semina fusiformia  $1\frac{2}{3}$  mm. longa  $\frac{1}{2}$  mm. lata plus minus oblique laevissima, testa coriacea, latere uno tenuiter costata; albumen copiosum.

HAB. Taihoku, Koteishō, leg. Y. SHIMADA, (No. 17) fl. et fr.

Near *Blyxa japonica* MAX. and *Blyxa caulescens* MAX., but differs from them by the much narrower fruits. I have examined several sets of the Japanese species with the ripe fruits. The fruits of the Japanese species are nearly as equal in length as those of the Formosan species, but as twice broader than those of the latter. The spathae of the Japanese are strongly 6-nerved, but those of the Formosan are very faintly nerved.

***Blyxa* (*Diplosiphon*) *Shimadai* HAYATA** sp. nov. (Fig. 77-g). Herba aquatica acaulis basi radices fibrosas radiatim profuse emittens. Folia fasciculatim disposita omnia radicalia lineari-lanceolata circ. 12 cm. longa 7 mm. lata apice acuminatissima basi gradatim attenuata, nervo centrali distincte viso, nervis lateralibus tenuissime obscure visis, margine integra membranacea tenuissima, venulis transversis tessellatim dispositis, glaberrima. Scapi uniflorati erecti glabri exceptis floribus 1-3 cm. longi apice interdum folia unica instructi vel haud foliati. Spatha cylindrica ad apicem scapi sita florem singulum includens, fructifera 3 cm. longa  $1\frac{1}{2}$ -2 mm. lata glabra recta apice 2-lobata basi abrupte truncata utroque latere tenuiter costata tenuissime membranacea fructus singulum perfecte includens. Flores apertientes non visi; flores post anthesin fructiferi: tubo calycis (ovario excepto)  $2\frac{1}{2}$  cm. longo  $\frac{1}{2}$  mm. lato glabro, lobis 3 linearibus 5 mm. longis 1 mm. latis apice obtusis glabris. Petala 3 linearia post anthesin evanescentia. Stamina 3, filamentis filiformibus 2 mm. longis tenuissimis, antheris linearibus  $1\frac{1}{2}$  mm. longis  $\frac{1}{10}$  mm. latis apice acuminatis. Styli 3

lineares  $2\frac{1}{2}$  mm. longi apice obtusi glabri. Fructus cylindrico-linearis 3 cm. longus  $1\frac{1}{2}$ –2 mm. latus apice ad tubum calycis abeuns basi obtusus multi-spermus, testa membranacea. Semina ellipsoidea  $1\frac{1}{2}$  mm. longa  $\frac{3}{4}$  mm. lata breve echinata utraque extremitate caudis instructa, caudis  $1\frac{1}{2}$  mm. longis, testa crustacea, albumen copiosum.

HAB. Taihoku: Koteishō, Hokuto, leg. Y. SHIMADA, Juli. 1915 (No. 16, a et b).

Near *Blyxa echinosperma* CLARKE, but differs from that in having three petals in a single flower.

**Blyxa** (*Diplosiphon*) **Somai** HAYATA sp. nov. Herba aquatica acaulis basi radices fibrosas profuse emittens. Folia fasciculatim disposita omnia radicalia linearia 30–40 cm. longa circ. 7 mm. lata apice acuminatissima basi haud attenuata haud contracta. Scapi uniflorati longissimi flore excepto circ. 25 cm. longi gracillimi cum floribus circ. 45 cm. longi folia in longitudine superans. Spatha una ad apicem scapi sita florem singulum includens, fructifera cylindrica 4–5 cm. longa  $2\frac{1}{2}$  mm. lata apice attenuata 2-lobata basi obtusa utroque latere tenuiter costata membranacea. Flores apertientes haud visi. Flores post anthesin fructiferi: calycis tubus ovario excepto 8 cm. longus filiformis 1 mm. latus, lobis linearibus 6 mm. longis  $\frac{2}{3}$  mm. latis apice obtusis. Petala post anthesin evanescentia linearia. Stamina 3 lobis calycis breviora, filamentis filiformibus 2 mm. longis, antheris linearibus 2 mm. longis. Styli 3 basi ad  $\frac{1}{8}$  coaliti, partibus liberis 4 mm. longis linearibus apice obtuso-acutis. Fructus cylindricus 5 cm. longus 2 mm. latus, testa tenuissime membranacea. Semina ellipsoidea  $1\frac{1}{2}$  mm. longa ad utramque extremitatem caudis instructa, caudis  $1\frac{1}{2}$ –2 mm. longis.

HAB. Hokuto, leg. H. INABA, 1911, Aug.; ibidem, leg. T. SŌMA, Feb. 1915.

Very near *Blyxa Shimadai*, but differs from it by the far much longer leaves and in the less echinate larger seeds. It may be a form of *B. Shimadai* growing in a deeper water.

### *Ottelia* PERS.

**Ottelia alismoides** PERS.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 3.

HAB. Uraisha, leg. S. SASAKI, Aug. 1910.

Distrib. Tropical Asia, Japan and North Australia. Compared with a Japanese specimen in the herbarium at Tōkyō.

## Burmanniaceæ.

*Burmannia* LINN.

***Burmannia liukiensis* HAYATA** sp. nov. (Fig. 77-A). Saprophytica maxima 14 cm. alta gracillima erecta ciliolata basi densiuscule squamata deorsum sursumque remotissime squamata, squamis inferioribus prope basin caulis sitis a se 1-2 mm. distantibus ovato-triangularibus 2 mm. longis  $1\frac{1}{2}$  mm. latis glabris caulem semi-amplectantibus ecoloratis squamis superioribus ecoloratis oblongis subplicatis 3 mm. longis in explicato  $2\frac{1}{2}$  mm. latis caulem semi-amplectantibus apice obtusis a se 3-4 cm. remotis. Caulis toto glaber maximus 14 cm. altus subteres vel subtetragnus a basi usque ad fere apicem haud ramosus prope apicem furcatus 2-3-plo ramosus, ramis a se angulo  $45^\circ$  egressis, ad basin ramorum squamis singulis sitis, ramis apice floribus singulis terminatis, ramis ultimis (vel pedicellis florum) 3-5 mm. longis plus minus tortuosis glabris. Perianthii tubus ovoideo-cylindricus  $3\frac{1}{2}$  mm. longus trigonus ad angulos alatus, alis medio latissimis utraque extremitate gradatim angustioribus; limbo urceolato-clauso  $1\frac{1}{4}$  mm. longo 3-lobato, lobis late triangularibus  $\frac{1}{3}$  mm. longis 1 mm. latis, lobulis secundariis singulis inter lobos sitis. Stamina 3 sessilia, sub lobulis secundariis limbo affixa, connectivis T-formibus  $\frac{1}{3}$  mm. longis utroque latere ad medium antheriferis. Stylus erectus 2 mm. longus, stigmatibus 3-lobatis, lobis leviter deorsum recurvis. Capsula perianthio persistenti coronata cum alis obovoidea supra basin usque ad tubum perianthii alata, medio inter alas transverse fissa, valvis tenuissimis hyalinis ecoloratis. Semina cum caudis fusiformi-linearia 1 mm. longa utraque extremitate caudata caudis exceptis  $\frac{1}{4}$  mm. longa ellipsoidea longitudinaliter striata, striis plus minus tortuosis.

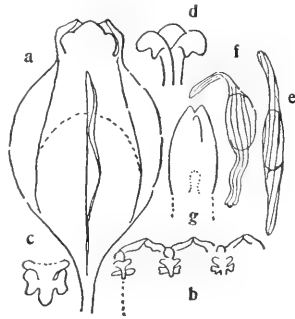


Fig. 77-A, *Burmannia liukiensis* HAYATA; a, a flower; b, apical portion of the perianth, expanded; c, an appendage with stamens; d, stigma; e, f, seeds; g, a bract, with young flower in it.

HAB. Loo-Choo: Tanekoshima, leg. K. TERUYA, Aug. 1910.

The plant was formerly referred to *B. nepalensis* which is but obscurely described in Hook. f. Fl. Brit. Ind. V. p. 666, and equally faintly illustrated by MIERS in Trans. Linn. Soc. XVIII. p. 537, t. XXXVIII. f.-1, under the name of *Gonyanthes nepalensis* MIERS. Though I have not seen the type, I strongly doubt its being the same as our plant. As far as the illustration of MIERS is concerned, our plant differs from that species by the much obtuse perianth-lobes and by the quite obtuse or rather blunted scales on the stems. Species of *Burmattia* on the whole seem to be very local, each region having the peculiar species of its own. Thus, *Burmattia japonica* which was formerly regarded as the same as the Indian *B. Championi* THWAITES is proved to be different from the latter. Our Loo-Choo plant is very likely to be also different from the Indian *B. nepalensis*. The description above given is drawn from a specimen with nature capsules crowned with a persistent perianth.

***Burmattia Takeoi* HAYATA sp. nov.** (Fig. 78). Saprophytica maxima 10 cm. longa ciliolata basi approximativ squamata sursum remotissime squamata, squamis prope basin caulis a se 5 mm. remotis late oblongis 3 mm. longis totiusque latis apice obtusissimis plicatis basi caulem semi-amplexantibus, superioribus a se 2-3 cm. remotis. Caulis 10 cm. longus ecoloratus vel plus minus cœruleo-purpurascens ad medium 1-2 plo ramosus vel cramosus, ramis erectis longiusculis apice flore singulo terminatis. Flores purpureo-cœrulei basi bracteis singulis vel duabus instructi plus minus obliqui 10 mm. longi. Perianthii tubus cylindricus (a supra ovarium usque ad sub limbo) 4 mm. longus plus minus oblique recurvus sub-trigonus inæqualiter alatus, alis a supra ovarium usque ad sub limbo extensis inæqualibus, ultra 2 mm. lata, ultra 1 mm. lata, medio

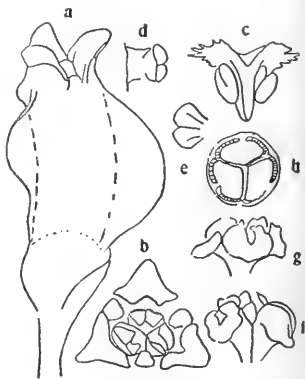


Fig. 78, *Burmattia Takeoi* HAYATA; a, a flower; b, limb of the perianth, seen from above; c, an appendage with stamens; d, a stamen, seen from front; e, the same, seen from back; f, g, stigmata; h, cross section of the ovary.

latissimis utramque extremitatem ad nullum reductis, limbo profunde 3-lobatis, lobis cuspidato-triangularibus ad apicem obtusis exteriore patentibus, lobulis secundariis inter lobos sitis minutis. Stamina 3 sub lobulis secundariis sita, connectivis Y-formibus medio utroque latere antheriferis apice crosis  $\frac{1}{2}$  mm. longis. Stylus erectus, stigmatibus 1 mm. longis 3-lobatis, lobis duplicato-plicatis. Ovarium subglobosum apice truncatum 2 mm. longum.

HAB. Urai, leg. TAKEO ITÔ, Nov. 1914.

Near *Burmannia Itoana* MAKINO (in Tōkyō Bot. Mag. XXVII. pp. 1 and 243, figs. 1-2), but differs from it by the unequal semi-oblong wings which are not truncate at the apex. Also allied to *B. cryptopetala* MAKINO, but easily distinguishable from it in the much larger flowers with unequally winged broader corolla-tubes.

## Orchideæ.

### *Nervilia* GAUD.

***Nervilia yæyamensis*** HAYATA Ic. Pl. Formos. IV. p. 118. Descriptio auctata: Bulbus globosus 1 cm. in diametro. Folia solitaria post anthesin e bulbo subterraneo oriunda, petiolo basi vaginato 5 cm. longo glabro, lamina reniformi-cordata  $2\frac{1}{2}$  cm. longa  $5\frac{1}{2}$  cm. lata apice breve acuta basi profunde cordata margine grosse undulata basi ad extremitatem acuta ad petiolum abeuns palmatim multinervia, nervis plus minus recurvis prope marginem subito sursum flexis margine parallelis cum eis superioribus junctis, venulis modice reticulatis utraque pagine glabris, membranacea horizontaliter patens cum petiolo angulo recto egressa.

HAB. Loo-choo: Nishiomotejima, leg. S. KANASHIRO, Juli. 1907.

## Scitamineæ.

### *Kæmpferia* LINN.

***Kæmpferia hainanensis*** HAYATA sp. nov. Herba parva circ. 15 cm. alta: caulis florifer e caule foliato discretus vel interdum haud discretus basi squamis latiusculis 4-5 involutus paucifolius, foliis 2-3. Folia longo petiolata, petiolis plus 5 cm. longis, lamina obovato-oblonga vel obovato-spathulata 7 cm. longa 2 cm. lata apice obtusa obtusissima basi longe attenuata utraque pagine

glabra. Scapi cum floribus circ. 10 cm. longi, pedunculis circ. 5 cm. longis basi squamis latiusculis 2-5 suffultis apice involucrium unum gerentibus. Involucrium cylindrico-campanulatum  $4\frac{1}{2}$  cm. longum 2 cm. latum apice 2-lobatum (lobis late triangularibus 2 cm. longis totiusque latis apice obtusissimis) basi obtuso-truncatum glabrum sub lente minute fusco-punctatum. Flores 10-15 ad basin involucri fasciculatim siti sessiles, sub floribus unicis bracteis singulis instructi, bracteis hyalinis membranaceis linearibus  $1\frac{1}{2}$  cm. longis 4 mm. latis apice obtusis. Ovarium ovoideum  $3\frac{1}{2}$  mm. longum 2 mm. latum. Calyx cylindrico-campanulatus 9 mm. longus apice 3 mm. latus apice brevissime 3-lobatus tenuissime membranaceus semi-hyalinus minute parcissime fusco-punctatus. Corollæ tubus longe filiformis apice campanulatus  $2\frac{1}{2}$  cm. longus medio  $1\frac{1}{2}$  mm. latus apice ad faucem 3 mm. latus, lobis 3, lobo postico ovato-oblongo 12 mm. longo 8 mm. lato apice breve cuspidato-acuto hyalino tenuissimo minute rubro-punctato, lobis laterali-bus paulo angustioribus. Labellum rotundato-obtriangulare 2 cm. longum totiusque latum tenuissimum basi cuneatum apice in ambitu rotundatum latissimum ad centrum profunde 2-lobatum, sinibus inter lobos angustissimis 2 mm. profundis, lobis se imbricatis margine integris vel subintegris minute fusco-punctatis, tenuissimum hyalinum medio longitudinaliter discis duobus instructum. Staminodia 2 conspicua spatulata 2 cm. longa 13 mm. lata apice rotundata basi unguiculata cum labelli breviter coalita margine integra tenuissime membranacea hyalina. Stamina 1, filamentum 3 mm. longo 2 mm. lato, anthera adnata basi auriculatim producta 3 mm. longa, partibus productis liberis  $\frac{1}{2}$  mm. longis, connectivis apice productis, partibus productis  $3\frac{1}{2}$  mm. longis  $2\frac{1}{2}$  mm. latis valde dilatatis apice rotundatis, stylo filiformi apice campanulato-dilatato margine ciliato. Glandule nullæ.

HAB. Hainan, leg. Z. KATSUMADA, 1910.

### *Hedychium* KEN.

**Hedychium coronarium** KENIG; FORBES et HEMSL. Ind. Fl. Sin. III. p. 69; K. SCHUMANN Zingiberaceæ in ENGLER Pfl.-reich p. 43, fig. 8.

HAB. Urai, leg. S. SASAKI, Aug. 1910, (cult.?).

### *Zingiber* ADANS.

**Zingiber Zerumbet** ROSC.: Bot. Mag. t. 2000; FORBES et HEMSL. Ind. Fl. Sin. III. p. 70; K. SCHUMANN Zingiberaceæ in ENGLER Pfl.-reich p.

172, fig. 24.

HAB. Taihoku, cult. leg. Y. SHIMADA, Aug. 1914.

SCHUMANN notes "Vorder- und Hinter-Indien. Die Pflanze wird nirgends mehr in dem Zustande des Indigenats getroffen."

*Alpinia* LINN.

On working up my collections of this genus, I have principally followed K. SHUMANN'S monograph appeared in ENGLER'S "Das Pflanzenreich." But, the delimitation of the subgenera is not quite applicable to the Formosan species. Both primary and flowering bracts are usually very deciduous and sometimes altogether wanting, and therefore it is difficult to determine the subgenera by the bracts. For convenience sake, I have divided the genus by the general characters of the plants, without taking any special reference to the primary and flowering bracts.

*Conspectus of the subgenera*

Bracts small, even the largest does not exceed 1 cm. in length; flowers small usually racemously paniculate.

I. *Autalpinia*.

Bracts none or very small; flowers middle-sized densely spicate or rarely racemose.

II. *Probolocalyx*.

Bracts very large, even the smallest not shorter than  $1\frac{1}{2}$  cm. in length, perfectly enclosing flower-buds; flowers large, racemose or paniculate rarely densely spicate.

III. *Catimbium*.

Subgenus I. *Autalpinia*

1. Leaves elongately oblong, not longer than four times than broad.....

..... *A. oblongifolia*.

Leaves linear-lanceolate or lanceolate, longer than four times than broad.....2.

2. Lips shortly and obtusely 2-lobed at the apex.....*A. kelungensis*.

Lips acutely 2-lobed at the apex.....*A. sp.*

***Alpinia oblongifolia*** HAYATA sp. nov. (Fig. 79-d, e). Caulis circ. 56 cm. longus glaber. Folia oblonga vel oblongo-lanceolata 21 cm. longa 6 cm. lata apice acuminata, acuminibus angustissime linearibus, basi rotundata vel rotundato-cuneata utraque glabra membranacea margine haud hirsuta, ligulis oblongis se latere interiore connatis. Panicula 10-12 cm. longa cum floribus

3 cm. lata, rhachis gracilis erecta recta glabra, pedicellis ordinis I. minus quam 1 cm. longis laxe dispositis sparsissime pubescentibus apice 3-4-floriferis, pedicellis ordinis II. 1 mm. longis vel subnullis. Ovarium urceolatum  $1\frac{1}{2}$  mm. longum  $1\frac{1}{3}$  mm. latum minute hirsutum. Calyx cylindraceus 7 mm. longus apice tenuiter 3-lobatus glaber. Corollæ tubus 7 mm. longus  $1\frac{1}{3}$  mm. latus glaber, lobis 3 fere conformibus 6 mm. longis 3 mm. latis margine interiore convolutis patentibus apice cuculliforme concavis; labellum oblongum 8 mm. longum 7 mm. latum apice 2-lobatum, lobis triangulari-cuspidiformibus 2 mm. longis basi 1 mm. latis margine crenulatis, in exsiccato flavum medio 2-striato-maculatum basi contractum. Stamina 1, filamentum 5 mm. longo glabro basi utroque latere discis auriculiformibus instructo, anthera oblonga 3 mm. longa medio plicata stylum amplectanti. Staminodia 2 linearia 2 mm. longa  $\frac{1}{4}$  mm. lata apice acuta a tubo corollæ angulo recto horizontaliter exteriore patentia glabra; glandulæ subcylindricæ  $1\frac{1}{2}$  mm. longæ latere singulo fissis basin styli amplectantes.

HAB. Formosa: loco non indicato.

Near *Alpinia chinensis*, but differs from it by the much broader leaves and by the two lobed lips; also separable from the following two species by the broader petals and by the somewhat folded yellowish (in a dried specimen) lips.

***Alpinia kelungensis*** HAYATA sp. nov. (Fig. 79-c). Caulis 1-2 m. altus, Folia lanceolata 35 cm. longa 9 cm. lata apice subito acuminatissima basi acuta margine haud hirsuta utraque pagine glabra, ligula oblonga 5 mm. longa obtusissima utraque pagine glabra margine hirsuta. Racemi circ. 20 cm. longi cum floribus 5 cm. lati laxè florati; rhachis florifera gracilis recta medio 2 mm. lata 20 cm. longa glabra erecta haud nutans, floribus laxiuscule dispositis, pedunculis (i.e. pedicellis ordinis I.) a se 1- $1\frac{1}{2}$  cm. remotis glabris ascendentibus 4-5 mm. longis alternis, (bracteis caducissimis vel eis ad basin pedunculorum obsoletis,) apice brevissime denseque ramosis, ramis (i.e. pedicellis ordinis II.) parcissime hirsutis vel subglabris apice florem singulorum gerentibus 1-2 mm. longis cum flore articulatis. Flores basi 1-bracteati, bracteis oblongis 6 mm. longis 4 mm. latis semi-hyalinis scariosis valde concavis alabastrum floris amplectantibus margine integris apice margine ciliatis. Flores suberecti. Calycis tubus vel ovarium cylindrico-globosum subglabrum  $1\frac{1}{2}$  mm. longum 1 mm. latum, limbo late tubiformi 5 mm. longo  $2\frac{1}{2}$  mm. lato apice plus minus latiore utraque pagine



glabro apice ciliolato tenuiter 3-4 lobato. Petala 3 a basi usque ad medium connata tubum formantia, tubo 8-9 mm. longo 2 mm. lato sursum plus minus latiore, partibus liberis petali postici obovato-oblongis 7 mm. longis 4 mm. latis apice valde concavis cuculliformibus rotundatis margine apiceque ciliolatis utraque glabris postice deorsum reflexis, partibus liberis petalorum lateralium eo postico angustioribus oblongis margine interiore recurvis concavis apice acutis glabris. Labellum basi cum tubo petalorum connatum, limbo libero antice reflexo expanso haud plicato 12 mm. longo 13 mm. lato rotundato apice obtuso brevissimo bilobato vel emarginato margine subintegro vel crenulato basi usque 2 mm. contracto glabro tenuissime membranaceo minute punctato. Stamen singulum, filamentum basi cum tubo corollæ connato, partibus exsertis 13 mm. longis glabris, anthera elliptica  $4\frac{1}{2}$  mm. longa 2 mm. lata medio plicata partem apicalem styli amplectanti apice emarginata 2-loculari; stylo filiformi glabro secus stamen recurvo apice cupuliforme dilatato, cupula margine ciliolata; glandulae ad apicem ovarii 2 semi-teretes. Staminodia 2 linearia 3 mm. longa  $\frac{1}{2}$  mm. lata deorsum reflexa in exsiccato complanata membranacea.

*Alpinia chinensis* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 423 (non ROSC.)

HAB. Kelung, leg. U. FAURIE, Mai. 1903.

Near *Alpinia intermedia* GAGN., but

differs from it by the sessile lips and glabrous anthers.

**Alpinia** sp. (Fig. 79-f, g.) Caulis circ.  $1\frac{1}{2}$  m. altus erectus rectus glaber. Folia lanceolata circ. 30 cm. longa circ. 5 cm. lata apice acuminatissima basi attenuata utraque pagine glabra ad marginem haud hirsuta, ligula membranacea oblonga integra glabra obtusa. Panicula 15-20 cm. longa cum floribus 2-2 $\frac{1}{2}$  cm.

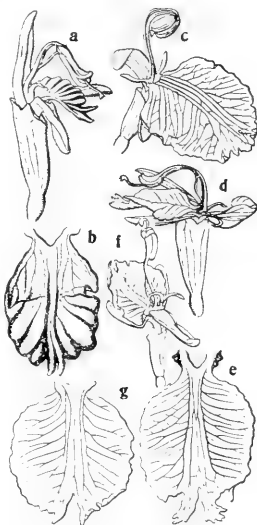



Fig. 79, a, a flower of *Alpinia japonica* MIQ.  $\times \frac{3}{4}$ ; b, a lip of the same,  $\times \frac{3}{4}$ ; c, a flower of *Alpinia kelungensis* HAYATA,  $\times 2$ ; d, a flower of *Alpinia oblongifolia* HAYATA,  $\times 2$ ; e, a lip of the same,  $\times \frac{3}{4}$ ; f, a flower of *Alpinia* sp.  $\times \frac{3}{4}$ ; g, a lip of the same,  $\times \frac{3}{4}$ .

lata glabra; rhachis gracilis erecta recta medio 2 mm. lata, pedicellis ordinis I. circ. 6 mm. longis glabris gracilibus apice 3-5-floratis, pedicellis ordinis II. brevissimis 1 mm. longis apice cum flore articulatis. Flores basi bracteis singulis instructi, bracteis caducissimis  $6\frac{1}{2}$  mm. longis valde concavis  $2\frac{1}{2}$  mm. latis apice rotundatis valde concavis alabastrum florum amplexantibus. Ovarium inferius  $1\frac{1}{2}$  mm. longum urceolatum  $1\frac{1}{3}$  mm. latum glabrum apice plus minus constrictum. Calyx cylindricus 8 mm. longus 2- $2\frac{1}{2}$  mm. latus glaber apice irregulariter lobulatus. Corollæ tubus erectus rectus 8 mm. longus 1 mm. latus glaber, lobis 3 conformibus linearibus 7 mm. longis margine interiore convolutis horizontaliter patentibus rectis. Labellum tubo corollæ angulo recto patens haud plicatum haud recurvum expans ovato-rotundatum 8-9 mm. longum 8 mm. latum apice bilobum, (sinus inter lobos triangulari-acutus 2 mm. longus), lobis triangularibus margine crenulatis, haud maculatum glabrum. Stamen singulum, partibus liberis filamenti 5 mm. longis glabris semi-teretibus facie antica 1-sulcatis glabris erectis cum anthera -formiter recurvis, anthera oblonga 3 mm. longa secus medium plicata exteriore recurva, connectivis plicatis exteriore et deorsum vix recurvo-productis, stylo filiformi filamento antheraque involuto sursum ab anthera exserto, partibus exsertis  $2\frac{1}{2}$  mm. longis apice cupuliformibus dilatatis, cupula margine minute ciliolata. Glandulæ 2 lineares semi-teretes  $1\frac{1}{2}$  mm. longæ. Staminodia 2 fauce tubi corollæ inserta linearia 3 mm. longa  $\frac{1}{3}$  mm. lata basi auriculiforme dilatata.

HAB. Suisha, Mai. 1912.

Near *Alpinia chinensis* Rosc., but differs from it by the lips which are two lobed at the apex. Also closely allied to *A. kelungensis* Hav., but distinguishable from it by the smaller flowers with smaller lips, nearly glabrous ovary and narrower longer calyx.

#### Subgenus II. *Probolocalyx*.

1. Leaves glabrous on both surfaces; if hairy, not velvety on the under surface.....2.
- Leaves velvety on the under surface.....5.
2. Leaves linear not exceeding 3 cm. in breadth.....3.
- Leaves lanceolate usually more than 4 cm. in breadth.....4.
3. Rhachis slender.....*A. Pricei*.

- Rhachis valid.....*A. sp. aff. officinarum.*  
 4. Bracteoles present.....*A. Shimadai.*  
 Bracteoles none.....*A. buisanensis.*  
 5. Calyx cylindrical.....*A. japonica.*  
 Calyx obliquely campanulate.....*A. Kawakamii.*

**Alpinia Pricei** HAYATA sp. nov. Caulis circ. 1 m. longus. Folia lineari-lanceolata circ. 30 cm. longa 23 mm. lata apice acuminatissima basi attenuata utraque pagine glabra, ligula oblonga apice obtusa margine dense barbata. Racemi circ. 10 cm. longi; rhachis pubescens laxiuscule florata, pedicellis brevissimis 2 mm. longis hirsutis. Ovarium inferius globosum villosum  $1\frac{1}{2}$  mm. longum totiusque latum. Calyx campanulato-tubulosus 1 cm. longus 6 mm. latus latere singulo fissus extus hirsutus intus glaber. Corollæ tubus campanulato-tubiformis 6 mm. longus apice 4 mm. latus extus glaber intus hirsutus, lobis 3, lobo postico obovato 2 cm. longo 1 cm. lato subglabro margine ciliolato, lobis lateralibus paullo angustioribus margine ciliolatis haud convolutis planis. Labellum obovato-rotundatum 2 cm. longum totiusque latum secus medium plicatum apice rotundatum brevissime 2-lobulatum margine crenulatum basi cuneato-contractum medio sursum minute tuberculatum. Stamen 1, filamentis validiusculis 12 mm. longis glabris  $1\frac{1}{2}$  mm. latis complanatis rectis, anthera erecta recta 7 mm. longa secus medium plicata. Staminodia obsoleta; stylo filiformi sursum hirsuto apice dilatato ciliolato. Glandulæ 2 apice ovarii sitæ  $1\frac{1}{2}$  mm. longæ semiteretes 1 mm. latæ.

HAB. Koarong, ad 2000 ped. alt., leg. W. R. PRICE, 1912, (flores albo-rubri).

**Alpinia** sp. nov.

*Alpinia officinarum* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 424, (non HANCE).

This *Alpinia* is most closely allied to *A. officinarum* from which it differs in having very much shorter ligules. Very probably a species not yet described.

**Alpinia Shimadai** HAYATA sp. nov. Caulis 1-2 m. altus. Folia lineari-lanceolata 25-70 cm. longa 4-10 cm. lata apice breve acuminata basi attenuata ad marginem hirsuta, ligula oblonga margine hirsuta. Spica late cylindrica 12-15 cm. longa cum floribus 5 cm. lata apice obtusa densissime florata ascen-

dens, rhachis densissime sericeo-villosa, pedicellis subnullis. Ovarium late cylindricum  $3\frac{1}{4}$  mm. longum  $2\frac{3}{8}$  mm. latum breve denseque villosum. Calyx subcylindricus 18 mm. longus ab apice deorsum usque ad medium latere uno fissus apice angusto-obconicus apice haud lobatus triangulari-obtusius extus hirsutus intus glaber. Corollæ tubus 8 mm. longus 2 mm. latus, lobis 3, lobo postico latiusculo subrotundato 18 mm. longo et lato interiore concavo apice subrotundato basi plus minus contracto margine ciliolato, lobis lateralibus angustioribus 18 mm. longis 7 mm. latis obovato-oblongis apice plus minus concavis margine ciliolatis. Labellum rotundatum 16 mm. longum et latum glabrum (apice obtusum?) basi contractum margine crispatum denticulatum basi callis duobus instructum subglabrum. Stamina 1, filamento 6 mm. longo glabro, anthera 8 mm. longa apice 2-lobata, connectivis secus longitudinem plicatis. Stylus filiformis glaber, stigmatibus margine ciliolato; glandulæ 2.

HAB. Tikushizan, leg. Y. SHIMADA, Mart. 1911; Shiehscitonzan, leg. S. SASAKI, Mart. 1911, fl.

**Alpinia Sasakii** HAYATA sp. nov. Folia oblongo-lineariter circ. 40 cm. longa 7-8 cm. lata apice acuta ad summum longe caulifera, caudis linearibus  $2\frac{1}{2}$  cm. longis  $1\frac{1}{2}$  mm. latis, margine integra ad marginem hirsuta basi acuta, ligula oblonga apice obtusa margine haud vel vix hirsuta. Spica elliptico-cylindrica 8 cm. longa cum floribus 4 cm. lata apice obtusa densissime florata; rhachis sericeo-villosa fulva validiuscula ascendens. Bractea nulla. Ovarium late globosum latius quam longius 2 mm. longum 3 mm. latum dense villosum. Calyx late cylindricus 13 mm. longus 7 mm. latus extus hirsutus intus apice subtruncatus sursum densiuscule hirsutus intus glaber latere uno ab apice usque ad supra medium fissus. Corollæ tubus 11 mm. longus  $3\frac{1}{2}$  mm. latus, lobis 3, lobo postico 23 mm. longo 17 mm. lato apice emarginato vel rotundato margine ciliolato, lobis lateralibus angustioribus. Labellum subrotundatum margine crispatum. Anthera linearis 1 cm. longa. Stylus apice hirsutus.



HAB. Buysan, leg. S. SASAKI, Mart. 1910.

Remarkable for the absence of the bracts.

**Alpinia japonica** MIQ. (Fig. 79-a, b), in Ann. Mus. Bot. Lugd. Bat. III. p. 140; FORBES et HEMSLEY, Ind. Fl. Sin. III. p. 72; MATSUM. et HAYATA Enum. Pl. Formos. p. 424; SCHUMANN Zingiberaceæ, in ENGL. Pfl.-reich IV.-46, p.

326, fig. 43, B-E.

HAB. Urai, leg. W. R. PRICE, Mart. 1912.

Rhachis inflorescentiæ 13 cm. longa ut videtur teres dense breveque hirsuta, floribus dense dispositis erecto-ascendentibus 2-3-fasciculatim sitis fere sessilibus vel brevissime pedicellatis, fasciculis floris alternatis, bracteis fere obsoletis minutis linearibus 2-3 mm. longis glabris, pedicellis brevissimis 1 mm. longis vel brevioribus villosis. Ovarium (i.e. pars calycis cum ovario connata) oblongo-cylindricum  $2\frac{1}{2}$  mm. longum. Sepala connata cylindrica 1 cm. longa medio 4 mm. lata apice plus minus latiora apice 3-lobata, inter lobos laterales fere usque ad medium fissa, lobo antico minore triangulari 2 mm. longo  $1\frac{1}{2}$  mm. lato, lobis lateralibus latioribus 3 mm. latis apice 2-lobulatis, lobis margine ciliolatis extus toto dense breveque hirsutis intus glabris. Petala 3 conformia anguste spathulata 13 mm. longa longissime unguiculata usque ad medium cum labello stamineque connata tubum formantia, tubo 6 mm. longo medio 1 mm. lato extus sparse hirsuto, limbis petalorum subpatentibus spathulatis sursum  $3-3\frac{1}{2}$  mm. latis apice rotundatis margine integris apice interiore recurvis valde concavis membranaceis 3-5-nerviis margine dense ciliatis. Stamen staminodium labellumque basi sursum usque ad fere medium connata tubum formantia, tubo 1 cm. longo ad faucem 3 mm. lato extus glabro intus hirsuto recurvo. Labellum cum tubo -formiter recurvum, lamina late oblonga 6 mm. longa totiusque lata secus medium plicata apice rotundata ad centrum apicis bicuspidata, cuspidibus triangularibus  $1\frac{1}{2}$  mm. longis 1 mm. latis, margine undulata vel lobulata utraque pagine radiatim maculato-striata medio secus longitudinem carinis 2 instructa. Stamen 1, partibus liberis filamentorum 6 mm. longis  $1\frac{1}{3}$  mm. latis vittæformibus dorso complanatis extus glabris lævibus intus 2-striatis late 2-sulcatis erectis apice angulo recto antice flexis, antheris late linearibus 7 mm. longis  $2\frac{1}{2}$  mm. latis apice emarginatis in sectione -formibus 2-ocularibus, loculis marginalibus angustissimis connectivis latissimis crasso-membranaceis 2 mm. latis utrinque haud productis. Staminodia 2 ad faucem erecta, partibus erectis 3 mm. longis  $\frac{2}{3}$  mm. latis erectis linearibus. Glandulæ 2 ex apice ovarii oriundæ semiteretes  $2\frac{1}{2}$  mm. longæ  $\frac{2}{3}$  mm. latæ. Stylus filiformis a basi liber secus stamen recurvus anthera involutus apice per antheram productus apice campanulato-cupuliformis dilatatus, partibus dilatatis  $\frac{1}{3}$  mm.

longis  $\frac{2}{3}$  mm. latis margine dense ciliatis. Ovarium 3-loculare, ovulis  $\infty$ .

SCHUMANN notes "Species floribus geminatis glandula inter pedicellos munitis ab omnibus mihi notis differt." So far as I have observed in several specimens collected in Japan and Formosa, there is no gland whatever between the geminate pedicels, but a minute abortive flower.

**Alpinia Kawakamii** HAYATA sp. nov. Caulis 1-2 m. altus. Folia lanceolata circ. 40 cm. longa 6 cm. lata apice acuminata basi longe attenuata supra glabra subtus velutinoso margine integra, ligulis oblongis 5 mm. longis apice obtusissimis extus intusque glabris. Spica 16 cm. longa cum floribus 3 cm. longa densissime florata; rhachis recta erecta validiuscula medio 5 mm. lata sericeo-villosa, pedicellis brevissimis 1 mm. longis, bractea nulla. Ovarium globosum 2 mm. in diametro villosio-tomentosum. Calyx cylindricus sursum plus minus dilatatus medio 5-6 mm. latus 15 mm. longus extus hirsutus intus glaber apice apertus irregulariter lobulatus unilateraliter alte fissus. Corollæ tubus 6 mm. longus glaber apice campanulatus, lobo postico latissimo obovato  $1\frac{1}{2}$  cm. longo 13 mm. lato apice fere truncato-rotundato extus sursumque hirsuto intus glabro, lobis lateralibus angustioribus margine plus minus convolutis. Labellum oblongum 2 cm. longum fere totiusque latum glabrum margine crispum (apice?) basi late cuneatum glabrum. Staminodia 0. Stamen 1, filamentum 6 mm. longo, anthera lineari 8 mm. longa apice breviter 2-lobulata; stylus sursum plus minus hirsutus. Glandulæ 2.

HAB. Taitō: Bokusekikaku, leg. T. KAWAKAMI, Aprili. 1907 (No. 4917).

Subgenus III. *Catimbium*.

1. Flowers densely spicate; spikes oblong.....*A. macrocephala*.  
Flowers usually racemose, paniculate or loosely spicate.....2.
2. Flowers spicate or nearly spicate, i.e. pedicels of the first order not longer than 3 mm.....3.  
Flowers racemose or paniculate .....4.
3. Flowers larger; rhachis 25 cm. long, very strong, 7 mm. in diameter.....*A. uraiensis*.  
Flowers smaller than the preceding; rhachis 15 cm. long, a little more slender than *A. uraiensis*.....*A. Katsumadai*.
4. Rhachis tomentose or densely hairy.....5.

- Rhachis glabrous or very slightly hairy.....7.
5. Anther-cells at the middle of the connectives.....*A. mesanthera*.  
 Anther-cells at the margin of the connectives..... 6.
6. Leaves glabrous at the margin.....*A. formosana*.  
 Leaves densely villose at the margin.....*A. speciosa*.
7. Staminodes subulate, hirsute, 2 mm. long.....*A. koshunensis*.  
 Staminodes none.....*A. flucitidis*.

**Alpinia macrocephala** HAYATA sp. nov. Caulis 1-2 m. altus. Ligula oblonga obtusa extus hirsuta, lamina folii sessili lineari-lanceolata circ. 80 cm. longa 11 cm. lata apice acuta vel acuminata basi attenuata margine integra ad marginem leviter denseque hirsuta supra glabra subtus præter costas sparse villosas glabra. Spicæ leviter punicescentes vel purpurascens fere sessiles vel pedunculatæ erectæ ellipsoideæ 9 cm. longæ 6 cm. latæ apice obtusissimæ densissime floratæ; rhachibus pedunculisque dense villosis; bracteæ sub spica singula duæ spicam amplexantes spathæformes oblongæ apice longè caudatæ caudis exceptis 10 cm. longæ 5 cm. latæ intus glabræ extus præsertim prope marginem et apice tenuiter villosæ ad marginem dense villosæ, caudis linearibus 2 cm. longis 2 mm. latis; bracteæ sub flore unico singulæ oblongæ 32 mm. longæ 20 mm. latæ apice acutæ brevè aristato-acuminatæ utraq. pagine glabræ alabastrum floris singulum amplexantes. Flores sessiles. Ovarium globosum 9½ mm. longum et latum dense villosum. Calyx late cylindricus 15 mm. longus 7-8 mm. latus basi extus hirsutus apice 2-lobatus latere uno ab apice usque ad supra medium fissus intus glaber. Corollæ tubus 13 mm. longus medio 2 mm. latus glaber, lobis 3, lobo postico obovato apice concavo 18 mm. longo 15 mm. lato, lobis lateralibus angustioribus 22 mm. longis 6 mm. latis apice obtusis obovato-linearibus. Labellum sub-rotundatum 2 cm. longum totiusque latum margine crispatum basi late cuneato-contractum. Stamen 1, filamentum vittæformi 7 mm. longo 2 mm. lato, anthera 8 mm. longa exteriore recurva apice 2-lobata. Staminodia obsoleta. Stylus filiformis apice ad stigma sparse ciliolatus. Fructus atrococcineus fusiformi-globosus 1½ cm. longus 1 cm. latus 6-spermus. Semina polygona 5 mm. longa totiusque lata arillis membranaceis albicantibus oblecta.

HAB. Mt. Arisan: inter Funkiko et Toroyen, leg. B. HAYATA et S. SASAKI, Jan. 1912 (fl.); ibidem, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914, (fr.).

**Alpinia uraiensis** HAYATA sp. nov. Caulis ultra 2 m. altus. Ligula oblongo-triangularis 10–15 mm. longa 6 mm. lata apice obtusa extus hirsuta intus glabra. Lamina folii sessilis lineari-lanceolata 1 m. longa 13 cm. lata utrinque acuminata margine glabra integerrima utraque pagine glabra chartacea. Racemi simplices; rachis florifera 25 cm. longa valida erecta recta 8 mm. in diametro sectionis dense strigoso-tomentosa multi-sulcata densiuscule florifera, bracteis sub pedicello singulis linearibus  $2\frac{1}{2}$  cm. longis 4–5 mm. latis utraque glabris, pedicellis validiusculis 5 mm. longis dense tomentosis; bractea sub flore singula ampla inflata late rotundata  $5\frac{1}{2}$  cm. longa plus lata apice plus minus fissa vel haud fissa extus basi hirsuta caeterum glabra intus toto glabra. Ovarium globosum dense strigoso-villosum 8 mm. longum cum pilis 8 mm. latum. Calyx campanulatus cylindricus  $3\frac{1}{2}$  cm. longus 2 cm. latus latere uno alte fissus apice tenuiter 6-lobulatus extus sparse hirsutus intus glaber. Corollæ tubus 13 mm. longus ad faucem 8 mm. latus extus sparse hirsutus vel subglaber intus subglaber, lobis 3, postico obovato-oblongo  $3\frac{1}{2}$  cm. longo 28 mm. lato apice rotundato margine subplano vel plus minus ad apicem interiore concavo-recurvo glabro vix vel haud ciliolato, lobis lateralibus paullo angustioribus plus minus patentibus. Labellum oblongo-triangulare 5 cm. longum 4 cm. latum sursum obcuneato-angustatum apice in ambitu truncatum 2-lobatum (lobis 6–7 mm. longis) basi latissimum subito truncatum contractum glabrum medio sursum minute tuberculatum radiatum striatum, striis prope marginem evanescentibus basi intus densissime villosum basi transverse callosis dense villosa-tomentosis instructum. Stamen 1, filamentum lato 1 cm. longo  $3\frac{1}{2}$  mm. lato vittæformi, anthera 18 mm. longa apice 2-lobata: stylus glaber apice cupuliforme dilatatus, partibus dilatatis margine dense ciliolatis. Glandulæ ad apicem ovarii 2 quadrangulæ-cuneiformes 3 mm. longæ totiusque late apice lobulatae. Staminodia 2 ad basin filamentorum sita linearia obtusa 2 mm. longa.

HAB. Urai, leg. Y. SHIMADA, Aprili. 1915.

This is the species having the largest flowers of the Formosan species belonging to the group of *Alpinia speciosa*.

**Alpinia Katsumadai** HAYATA sp. nov. Folia petiolata, ligula oblonga 8 mm. longa 5 mm. lata apice obtuso-rotundata margine ciliata extus hirsuta intus glabra, lamina lineari-lanceolata 60 cm. longa 9 cm. lata apice acuminata



ad summum lineari-caudata basi acuta margine integra ad marginem tenuiter hirsuta supra glaberrima subtus subglabra vel rarissime paucissime hirsuta, petiolis i.e. partibus inter vaginam et laminam  $1\frac{1}{2}$ –2 cm. longis. Flores racemosi; rhachis racemi 20 cm. longa vix nutans dense strigoso-hirsuta, pedicellis 3 mm. longis dense tomentosis; bracteis sub flore singulis dilatato-subcylindricis  $3\frac{1}{2}$  cm. longis 17 mm. latis latere uno usque ad basin fissis apice 3-lobatis extus deorsum hirsutis sursum glabris intus toto glabris alabastrum floris amplexantibus. Ovarium globosum dense longeque villosum, pilis patentissimis, cum pilis 5 mm. latum totiusque longum. Calyx obconico-cylindricus 22 mm. longus 12 mm. latus latere uno ab apice usque ad 12 mm. fissus extus hirsutus intus glaber apice margine irregulariter denticulatus sub-ciliatus vel haud ciliatus. Corollæ tubus 8 mm. longus extus glaber intus dense villosus subcampanulatus ad faucem 8 mm. latus, lobis 3 sub erectis, postico latiore, lateralibus paullo angustioribus  $2\frac{1}{2}$  cm. longis obovato-oblongis 1 cm. latis margine interiore convolutis margine ciliolatis apice valde concavis rotundatis glabris. Labellum triangulari-ovatum  $3\frac{1}{2}$  cm. longum 3 cm. latum apice obtusum tenuiter 2-lobatum basi late cuneato-contractum glabrum medio striato-subcarinatum versus marginem radiatim striatum, striis coloratis interdum latiusculis. Staminodia obsoleta; glandule ad apicem ovarii sitæ 2 semi-cubiformes glabræ  $1\frac{1}{2}$  mm. longæ. Stamen 1, filamentum erecto recto vittæformi glabro  $2\frac{1}{2}$  mm. lato, anthera 12 mm. longa apice 2-fida. Stylus filiformis glaber apice cupuliformis dilatatus, partibus dilatatis extus hirsutis margine ciliolatis.

HAB. Hainan, leg. Z. KATSUMADA, 1910.

Near *A. hainanensis* K. SCHUMANN (Zingiberaceæ in ENGLER Pf.-reich p. 335), but differs from it by the much broader leaves with quite obtuse ligules, in the absence of terminal bracts, in the straight rhachis and in many other points.

***Alpinia mesanthera*** HAYATA sp. nov. Caulis 1 m.–2 m. altus. Ligulæ duæ margine interiore connatæ apice rotundatæ intus glabræ extus hirsutæ margine longe barbato-hirsutæ. Lamina folii sessilis lineari-lanceolata 60 cm. longa 10 cm. lata apice acuminata basi abrupte cuneato-acuta margine integra ad marginem densissime sericeo-villosa utraque pagine glabra. Racemi 27 cm. longi, (pedunculis 5–7 cm. longis hirsutis); rhachis 27 cm. longa erecta præser-

tim ad nodos dense fulvo-villosa laxissime florata recta, floribus a se 1-3 cm. remotis, pedicellis angulo recto a rhachibus divaricatis hirsutis; bractea inflata 22 mm. longa 17 mm. lata (in explicato 30 mm. lata) latere uno fissa apice 2-3-lobata utraque pagine glaberrima. Ovarium oblongo-globosum 3 mm. longum  $2\frac{1}{2}$  mm. latum dense strigoso-villosum. Calyx cylindricus 2 cm. longus 1 cm. latus apice 3-lobatus latere uno alte fissus intus glaberrimus extus basi hirsutus apice ciliolatus. Corollæ tubus tenuiter cylindricus 13 mm. longus 2 mm. latus extus glaber, lobis 3, lobo postico obovato-rotundato 3 cm. longo  $2\frac{1}{2}$  cm. lato apice emarginato vel brevissime 2-lobato margine haud convoluto sed subplano ciliolato tenuissimo glabro, lobis lateralibus angustioribus oblongo-spathulatis margine plus minus involutis. Labellum rotundatum 3 cm. longum totiusque latum apice brevissime bilobatum basi rotundato-contractum margine denticulatum facie supra sursum minute cristato-tuberculatum. Stamen 1, filamentum erecto recto vittæ-formi 1 cm. longo 3 mm. lato hirsuto, anthera oblongo-obcuneiformi 1 cm. longa apice obtuso-obscagittiformi  $5\frac{1}{2}$  mm. lata, loculis antheræ secus medium firme approximatis, connectivis latis planis haud plicatis medio loculiferis pilis brevissimis globuliferis dense obtectis. Staminodia duo in tubercula hirsuta prope basin labelli disposita. Styli filiformes apice hirsuti.

HAB. Kappazan, leg. B. HAYATA, Juli. 1912.

Remarkable for the complanate broad connectives with anther-cells on the middle, but not on the margin.

**Alpinia formosana** K. SCHUM. in ENGL. Bot. Jahrb. XXVII. (1899) p. 283, et in ENGL. Pfl.-reich IV.-46, p. 340. "Folia ad 10 mm. longe petiolata lanceolata utrinque acuminata glaberrima ad 40 cm. longa et 8 cm. lata; ligula ad 10 mm. longa obtusa dorso pilosula. Panicula ad 15 cm. longa, rhachis præcique prope pedunculos pilosa, bractæ bifloræ ad 2,5 cm. longæ breviter apiculatæ; flore 3 mm. longe pedicellato; ovarium albo-sericeum; calyx tridenticulatus unilateraliter fissus ad 1,7 cm. longus glaber; corollæ glabræ tubus 10 mm. longus, lobi ad 2,2 cm. metientes; labellum ad 3 cm. longum crispulum breviter bilobum; stamen 2,0 cm. longum, anthera contra filamentum rectanque genuflexa; connectivi appendicula 0; staminodia lateraliter subulata vix 2 mm. longa; nectarii glandulæ 2 concavo-convexæ 1,5 mm. longæ. Nota: Glabrities perfecta calycis et corollæ, anthera genuflexa hanc speciem optime distinguunt."

HAB. Hakketu, leg. B. HAYATA, Juli. 1912, (fl.).

***Alpinia speciosa*** K. SCHUM. Zingiberaceae in ENGLER Pfl.-reich p. 339.

*Alpinia nutans* ROSC.; MATSUM. et HAYATA Enum. Pl. Formos. p. 423.

HAB. Taihoku.

***Alpinia koshunensis*** HAYATA sp. nov. Caulis circ. 2 m. altus. Ligula extus dense sericeo-villosa intus glabra, lamina lanceolata circ. 50 cm. longa apice acuminata basi attenuata utraque pagine glabra margine glabra vel tomentosa; rhachis paniculae circ. 20 cm. longa subglabra sed ad insertionem pedicellorum dense villosa, pedicellis ordinis I.  $1\frac{1}{2}$  cm. longis gracilibus glabris, pedicellis ordinis II. (i.e. ultimis) 2–3 mm. longis; bractea obconico-tubiformis inflata apice plus minus contracta 2 cm. longa totiusque lata latere uno ad basin fissam apice 3-lobata, lobis triangulari-acutis utraque pagine glabris. Ovarium globosum 4 mm. longum totiusque latum densissime villosum. Calyx obconico-campanulatus 18 mm. longus sursum 13 mm. latus toto glaber apice 3-lobatus latere uno alte fissus. Corollae tubus 13 mm. longus tubuloso-campanulatus, lobis 3, postico oblongo latissimo 2 cm. longo totiusque lato valde concavo, lobis lateralibus paullo angustioribus glabris margine haud ciliatis. Labellum triangulari-rotundatum 3 cm. latum totiusque longum apice obtusum vel tenuiter emarginatum basi contractum supra sursum tuberculatum tenuiter radiatim striatum margine crenulatum vel integrum. Stamen 1, filamentum 1 cm. longo plus minus recurvo, anthera 8 mm. longa plus minus recurva. Styli filiformes deorsum minus sursum plus dense hirsuti. Staminodia subulata hirsuta 2 mm. longa. Glandulae 2 ad apicem ovarii sitae 2 mm. longae.

HAB. Koshūn, leg. S. KATŌ, Mai. 1909.

***Alpinia fluviatilis*** HAYATA sp. nov. Caulis 1–2 m. altus. Ligula 7 mm. longa oblonga margine interiore connata extus hirsuta intus glabra, lamina lanceolata 40 cm. longa 5–6 cm. lata apice acuminata basi attenuata utraque pagine glabra ad marginem sericeo-villosa. Racemi 10–15 cm. longi nutantes; rhachis glabra vel sparsissime hirsuta latiuscule florata, pedicellis patentissimis  $1\frac{1}{2}$  cm. longis; bracteis conchi-formibus  $2\frac{1}{2}$  cm. longis clausis alabastrum floris singulorum perfecte amplexantibus apice apiculatis unilateraliter fissis utraque pagine glabris apice haud apertis. Ovarium globosum  $3\frac{1}{2}$  mm. longum tomentosum. Calyx campanulato-cylindricus 18 mm. longus medio 8 mm. latus apice

irregulariter lobulatus unilateraliter usque ad medium fissus extus basi plus minus hirsutus intus glaber. Corollæ tubus glaber 13mm. longus medio 4mm. latus apice campanulato-dilatatus, lobo postico obovato 3cm. longo 2cm. lato apice plus minus convoluto margine tenuiter vix ciliolato, lobis lateralibus angustioribus glabris. Labellum late rotundatum  $4\frac{1}{2}$  cm. longum totiusque latum (apice acuminato-obtusum?) basi late truncatum subito truncatim contractum haud unguiculatum basi secus medium plicatum sursum expansum supra sursum minute tuberculato-punctatum basi intus hirsutum intus utroque latere callis (vel staminodiis?) hirsutis instructum. Stamen 1, filamentum 12mm. longo vittæformi intus sparse hirsuto extus glabro, anthera oblonga 11mm. longa apice 2-lobulata plicata stylum amplexantem. Stylus filiformis sursum hirsutus. Glandulæ 2 ad apicem ovarii sitæ.

HAB. Dakusui-Kēi, leg. B. HAYATA et S. SASAKI, Mai. 1912 (fl.).

*Phrynium* WILLD.

*Phrynium capitatum* WILLD.; WIGHT Ic.

Pl. Ind. Or. t. 2016; FORBES et HEMSL. Ind. Fl. Sin. III. p. 73.

HAB. Hainan, leg. Z. KATSUMADA, 1910.

*Clinogyne* SALISB.

*Clinogyne dichotoma* SALISB? HOOK. f.

Fl. Brit. Ind. VI. p. 258.

*Phrynium dichotomum* ROXB.

*Maranta dichotoma* WALL.

*Donax Arundinastrum* LOUR.

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912.

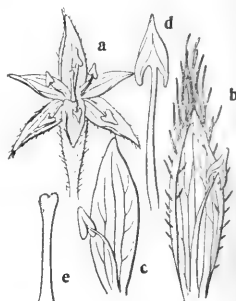


FIG. 79-B, *Hypoxis aurea* LOUR.; a, a flower; b, an outer lobe; c, an inner lobe; d, an anther; e, a style; all figures are more or less magnified.

Amaryllideæ.

*Hypoxis* LINN.

*Hypoxis aurea* LOUR. (Fig 79-B); HOOK. f. Fl. Brit. Ind. VI. p. 277; FORBES et HEMSL. Ind. Fl. Sin. III. p. 86; MATSUM. et HAYATA Enum. Pl. Formos. p. 429; DUNN et TUTCH. Fl. Hongk. et Kwangt. p. 274.

HAB. Tamsui, leg. T. YUBASHI, Feb. 1912, (fl.).

## Liliaceæ.

*Polygonatum* ADANS.***Polygonatum alte-lobatum* HAYATA** sp. nov. (Fig. 80). Herba: caulis

glaber teres 40 cm. altus medio sursum remote foliatus. Folia alterna breve petiolata oblongo-lanceolata 11–12 cm. longa 3–3½ cm. late apice acuminata ad summum obtusa basi acuta ad petiolum 5 mm. longum abeuntia margine integra parallelo-nervia membranacea. Flores axillares solitarii vel gemini, pedicellis 1–2 cm. longis glabris pendulis vel erectis. Flores penduli. Perianthium subcampanulatum profunde 6-lobatum, tubo 1–2 mm. longo, lobis oblongis imbricatis suberectis vel vix patentibus 6 mm. longis 2½ mm. latis basi plus minus angustatis apice obtusis vel obtusissimis ad apicem dense granulatis utraque glabris. Stamina 6 lobis perianthii opposita medio perianthii affixa subsessilia vel filamentis brevissime stipitata, filamentis ½–1 mm. longis complanatis, antheris ovato-oblongis 1½ mm. longis ⅔ mm. latis apice acutis apiculatis basi 2-lobatis introrsum dehiscentibus. Ovarium ovoideum sessile 2½ mm. longum 1½ mm. latum glabrum, stylo columniformi 1 mm. longo, stigmate subgloboso obscure lobato. Ovarium 3-loculare, ovulis numerosis anatropis erectis.

HAB. Mt. Arisan, leg. S. SASAKI, Mai. 1913, (No. 11).

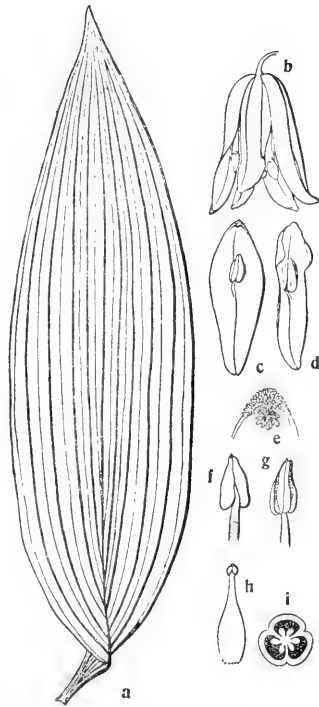


Fig. 80. *Polygonatum alte-lobatum* HAYATA; a, a leaf; b, a flower; c, an outer sepal; d, an inner sepal; e, apical portion of a sepal, seen from within; f, g, a stamen, seen from different sides; h, ovary; i, cross section of the same. Fig. a, natural size; b, c, d, and h,  $\times 3.5$ ; others much more magnified.

It is with some hesitation that I have referred this plant to *Polygonatum*. It agrees with the same genus in "Perianthium marcescens, demum deciduum. Stamina 6, antheræ oblongo-lineares, erectæ, basi 2-lobæ, dorsifixæ, loculis introrsum dehiscentibus. Ovarium sessile oblongum v. globosum 3-loculare; stylus breviter columnaris, stigmate parvo v. parum incrassato; ovula in loculis  $\infty$ . (BENTH. et HOOK. f. Gen. Pl. III. p. 768)"; but differs from the genus by the much longer perianth-lobes which are longer than the tubes, by the very short perianth-tubes, by the nearly sessile apiculate anthers which are attached to the middle of the perianth and by the pedicels which are not articulated under the calyx. In *Polygonatum*, the perianth-tubes are "cylindrico basi interdum latiore; lobi breves, erecto-patentes; stamina tubo affixa coque inclusa, filamentis filiformibus rarius complanatis; pedicellis sub apicem articulatis.—l.c. p. 768" and "Blh. cylindrisch mit 6 dreieckigen oder lanzettlichen kurzen Abschnitten. Stf. bis über die mitte der Röhre mit derselben vereinigt. A. am Grunde 2-lappig, länglich, nach innen aufspringend. Bl. stiele unterhalb der Bl. gegliedert. (ENGLER Pfl.-fam. II.-5, p. 80)." HOOKER states in his Flora of British India VI. p. 319 that "anthers subsessile on or above the middle of the tube, included dorsifixed." Upon considering all the above accounts, this new plant may be referred to *Polygonatum* rather than to be regarded as representing a distinct genus.

### *Disporopsis* HANCE

in Journ. Bot. (1883) p. 278; ENGLER in Pfl.-fam. II.-5, p. 81, et Nacht. II.-5, p. 76; DUNN et TUTCH. Fl. Hongk. Kwangt. p. 279.

***Disporopsis arisanensis*** HAYATA sp. nov. Rhizoma teres repens remote radiceferum viride cicatricibus squamarum notatum, (cicatricibus annuli-formibus), incrassatum leve glabrum 5-6 mm. in diametro, (radicibus teretibus longiusculis 2 mm. in diametro), prope apice lateraliter (vel quasi-lateraliter?) supra terram caulem singulum verticaliter emittens apice acutum squamis latiusculis 5-6 obteetum. Gemma caulis ad apicem rhizomatum sita elongata horizontaliter ascendens cylindrica apice acuta squamis dense approximativè dispositis complete obteeta, squamis inferioribus triangularibus brevioribus amplexicaulibus, superioribus elongatis basi cylindrico-vaginatibus apice triangulari-obtusis caulem amplexantibus glabris. Caulis glaber teres crassiusculus 30-40 cm. longus glaberrimus

basi haud squamatus basi 5 mm. in diametro sectionis subrectus suberectus sed plus minus recurvus a basi usque ad medium ciliatus rectus a medio ad apicem foliatus plus minus flexuosus. Folia alterna a se 2-3 cm. remota dorsiventraliter disposita ovato-oblonga crassiuscula in exsiccatu tenuiter chartacea  $7\frac{1}{2}$ -9 cm. longa 3-4 cm. lata apice caudato-acuminata (caudis  $\frac{1}{2}$ -1 cm. longis apice obtusis) basi rotundata integra glaberrima supra in vivo viridissima subtus pallidissima parallelo-nervia, nervis supra impressis subtus elevatis, petiolis 7-15 mm. longis basi cum pulvino articulatis glabris. Flores axillares solitarii nutantes, pedicellis 2 cm. longis glabris sub apice articulatis, stipitibus perianthii 1-2 mm. longis. Perianthium late campanulatum cum lobis 13-15 mm. longum latius quam longius, tubo obconico 3 mm. longo, lobis 6 patentibus medio sursum subito exteriore reflexis 11-10 mm. longis circ. 5 mm. latis apice obtusis granulato-muricatis basi haud contractis 3-nerviis margine tenuissimis plus minus imbricatis glabris. Stamina 6 lobis perianthii opposita, filamentis (vel laciniis coronæ) valde dilatatis ex apice tubi perianthii oriundis 7 mm. longis 4 mm. latis glabris usque ad medium se connatis coronam formantibus apice profunde 2-lobatis, lobis linearibus 3 mm. longis 1 mm. latis, antheris sub sinu inter lobos filamentorum sitis ovato-oblongis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis apice acutis apiculatis basi 2-lobatis. Ovarium ovoideum sessile 4 mm. longum 3-loculare 3-lobatum, (lobis medio 1-sulcatis), glabrum medio transverse leviter constrictum apice ad stylum abeuns, stylo columniformi 3 mm. longo glabro apice stigmatoso dense minute globuloso-setulifero, ovulis in quoque loculo 6 horizontaliter dispositis anatropis. Bacca globosa circ. 1 cm. in diametro fusco-purpurascens 4-5-sperma. Semina subglobosa plus minus angulata 5 mm. in diametro apice umbonata, umbonibus rubescentibus, testa membranacea; albumen osseum.

HAB. Mt. Arisan: Nimandaira, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1915, (fructus); Mt. Arisan, leg. S. SASAKI et B. HAYATA, Jan. 1915, fl. et fr. (typus!); Tōzan, leg. G. NAKAHARA, Oct. 1905.

It is with some hesitation that I have referred this species to *Disporopsis*, whose original description is rather too imperfect to be clearly understood. To begin with the perianth, the description runs "perigonium corollinum, campanulatum, basi leviter saccatum, segmentis 6, subæqualibus, crassiusculis, uninerviis, tubo duplo longioribus." So far, this agrees fairly well with our plant.

Then comes the corona "Corona apice tubi inserta, lobis paulo brevior, ultra medium in lacinias 6, staminibus alternantes, lineares, acutas, conniventes, genitalia omnino velantes, fissa." I have been very much puzzled to understand what is meant by the "corona." As to the stamens, it is stated "stamina 6, inter coronæ lobos affixa." The explanation which I shall give to the "corona," judging from the position of the anthers, is that it is a cylindrical tube, composed of dilated filaments which are united one to another and protrude far beyond the insertion of the anthers, but the points of insertion are terminated by the anthers themselves. In other words, the corona is a tube formed by the perfectly united broad filaments which are sagittately 2-lobed at the apex and have anthers at the sinus between the lobes. Then follows "filamentis brevissimis; anthers introrsis, brevibus, dorsifixis, secus margines dehiscentibus. Ovarium sessile, ovoideum, trigastrum, triloculare. Stylus brevis, crassiusculus; stigma punctiforme. Ovula in quoque loculo 4, angulo interno affixa, horizontalia. Bacca.....? Herba rhizomatosa, caulescens,....." If my explanation of the "corona" is correct, our plant perfectly accords with HANCE's original description in the generic characters. The Formosan species has filaments with sagittate apex, partly united, but distinct nearly half way down. The point of difference between HANCE's species and mine is, therefore, whether the filaments are perfectly united one to another or connate for half their length, which however can scarcely warrant that the two are not congeneric.

**Disporopsis leptophylla** HAYATA sp. nov. (Fig. 81) Rhizoma repens; caulis ad apicem rhizomatis terminaliter situs ascendens 37 cm. longus basi squamis latissimis pluriis suffultus glaber teres medio 5 mm. in diametro sectionis a basi usque ad  $\frac{2}{3}$  altitudinem efoliatus sursum foliatus, partibus foliatis 7 cm. longis. Folia alterna tenuissime membranacea ovato-oblonga 8 cm. longa 4 cm. lata apice caudato-acuminata ad summum obtusa basi rotundata margine integra, petiolis 1 cm. longis basi articulatis. Flores axillares solitarii nutantes, pedicellis glabris 1 cm. longis sub apice articulatis, stipitibus perianthii 1 mm. longis. Perianthium pendulum tubuloso-campanulatum 9-10 mm. longum 6 mm. latum apice 6-lobatum, tubo 3 mm. longo, lobis 2-seriatim dispositis oblongis 6 mm. longis basi contractis  $3\frac{1}{2}$  mm. latis apice obtusis vel obtusissimis apice granulato-muricatis margine tenuissimis imbricatis contactis. Corona (i.e. tubus



filamentorum dilatorum se connatorum) ex apice tubi perianthii oriunda 4 mm. longa erecta glabra apice 5-laciniata, laciniis circ. 2 mm. longis apice 2-lobatis, lobis obtusis. Stamina 6 lobis perianthii opposita ad coronam adnata sub sinibus inter lacinas coronæ disposita, antheris ovato-oblongis 2 mm. longis  $1\frac{1}{2}$  mm. latis apice acutis et apiculatis basi 2-lobatis. Ovarium ovoideum 3 mm. longum apice ad stylum abeuns glabrum. Stylus columniformis 4-5 mm. longus apice 3-lobatus stigmatosus.

HAB. Mt. Arisan, leg. S. SASAKI, Mai. 1912.

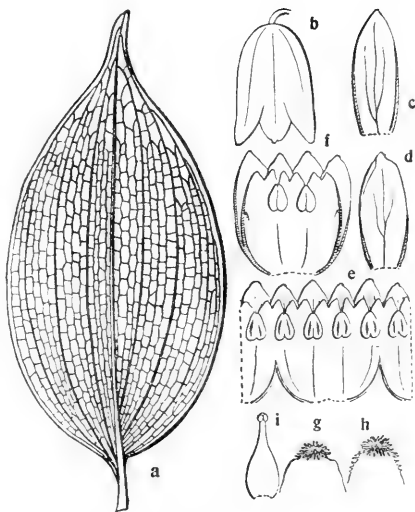


Fig. 81, *Disporopsis leptophylla* HAYATA; a, a leaf, natural size; b, a flower; c, an outer sepal; d, an inner sepal; e, perianth and corona expanded; f, the same, partly taken off; g, apical portion of a perianth-lobe, seen from within; h, the same, seen from without; i, ovary. Figs. b, c, d, e, f, and i,  $\times 2$ ; others much more magnified.

### *Trillium* LINN.

**Trillium Tschonoskii** MAXIM.; FORBES et HEMSL. Ind. Fl. Sin. III. p. 144.

HAB. In montibus: Tokunankai, leg. T. KAWAKAMI et U. MORI, Aprili. 1910, fl.

DISTRIB. China and Japan.

### *Smilax* LINN.

**Smilax arisanensis** HAYATA (Fig. 82) Mater. Fl. Formos. p. 356. Descriptio auctata: Pedunculi graciles  $1\frac{1}{2}$  cm. longi complanati axillares solitarii apice flores 10-15 umbellatim gerentes, radiis umbellarum (pedicellis floris) 2-3 mm. longis basi bracteis minutis obtusis instructis. Perianthii segmenta 6 inaequalia, exteriora obovato-oblonga 2 mm. longa  $1\frac{1}{2}$  mm. lata intus valde concava extus

convexa apice dorso carinata ad apicem interiore recurva breve apiculata, apiculis deorsum vergentibus, utraque pagine glaberrima, segmenta interiora paullo minora valde crassa oblonga  $1\frac{3}{4}$  mm. longa 1 mm. lata extus convexa intus plana apice apiculata, apiculis interiore deorsum recurvis. Stamina perfecta non visa. Staminodia 3 segmentis exterioribus opposita et basi segmentorum affixa subulato-lineararia 1 mm. longa glabra. Ovarium obovoideum  $1\frac{1}{2}$  mm. longum 1 mm. latum glabrum, stigmatibus sessilibus perfecte 3-fidis, segmentis horizontaliter patentissimis dorso complanatis ovato-lanceolatis  $\frac{1}{2}$  mm. longis.

HAB. Mt. Arisan : Hasegawakei, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

**Smilax nervo-marginata** HAYATA Mater. Fl. Formos. p. 361. Descriptio auctata: Flores monœcii; pedunculi umbellarum solitarii axillares valde complanati 2 cm. longi glabri  $1\frac{1}{2}$  mm. lati; umbella circ. 20-radiata, radiis patentissimis gracilibus 8 mm. longis glabris. Fl. ♂: segmenta perianthii 6 tota distincta oblongo-linearia-ovata 3 mm. longi  $1\frac{1}{4}$  mm. lata apice acuta ad summum obtusa tenuiter interiore recurva, partibus recurvis  $\frac{1}{3}$  mm. longis fere contactis, basi plus minus angustata ad basin  $\frac{2}{3}$  mm. lata margine plus minus interiore plicata (valvata?) 1-nervia utraque pagine plicata in flore apertienti deorsum descendencia subrecta haud recurva. Stamina 9, exteriora 6 segmentis opposita, filamentis basi cum segmentis adnatis plus minus decumbentibus complanatis  $\frac{2}{3}$  mm. longis  $\frac{1}{3}$  mm. latis, staminibus interioribus 3 distinctis erectis, filamentis totis glabris, antheris conformibus linearibus 1 mm. longis  $\frac{1}{3}$  mm. latis cum filamento aequalis. Rudimentum ovarii 0. Fl. ♀: ignoti. Fructus præmaturus globosus lævis apice reliquis stigmatum sessilium coronatus.

HAB. Loo-Choo : Mt. Onna, leg. S. KANASHIRO, Mart. (fl. ♂), 1912.

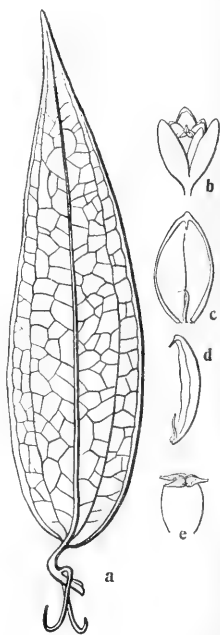


Fig. 82, *Smilax arisanensis* HAYATA; a, a leaf; b, a female flower; c, a segment; d, the same, seen from side; e, ovary.

*Heterosmilax* KUNTH.

***Heterosmilax arisanensis*** HAYATA sp. nov. (Fig. 83). Caulis scandentissimus glaber teres longitudinaliter striatus vel sulcatus, ramis infra-axillaribus. Folia adulta alterna oblongo-cordata 17 cm. longa 11 cm. lata apice caudato-acuminata ad summum acuminata basi cordata margine integra vel repanda plana tenuia 7-nervia chartaceo-membranacea, petiolis 2-3 cm. longis basi utroque latere cirrhiferis, cirrhis ab axilla 2-3 mm. remotis simplicibus spiraliter recurvis. Folia hornotina oblongo-lanceolata 7-8 cm. longa  $3\frac{1}{2}$  cm. lata apice acuminata basi rotundata 5-7-nervia, nervis venis venulisque utroque latere elevatis gracillimis grosse reticulatis. Pedunculi solitarii axillares  $3\frac{1}{2}$  cm. longi dorso complanati 1 mm. lati glabri apice umbellatim flores circ. 30 gerentes, radii (vel pedicellis) 1 cm. longis glabris rectis gracilibus; receptaculo 4 mm. in diametro dense bracteis oblecto, bracteis castaneis late rotundatis apiculatis. Perianthium floris 1 fusiforme apice obtuso-truncatum basi attenuatum glabrum 6 mm. longum 3 mm. latum glabrum crassiusculum apice brevissime 3-lobatum, lobis  $\frac{1}{5}$  mm. longis  $\frac{2}{3}$  mm. latis clausis. Stamina 3, filamentis 2 mm. longis valde complanatis circ. 1 mm. latis apice plus minus angustioribus tenuissimis basi se connatis apice ad antheram abeuntibus cum antheris æquilatis, antheris basifixis adnatis oblongis  $\frac{2}{3}$  mm. longis  $\frac{1}{2}$  mm. latis leviter obscureque apiculatis basi late sagittiformibus toto cum filamento adnatis. Fructus ignotus.

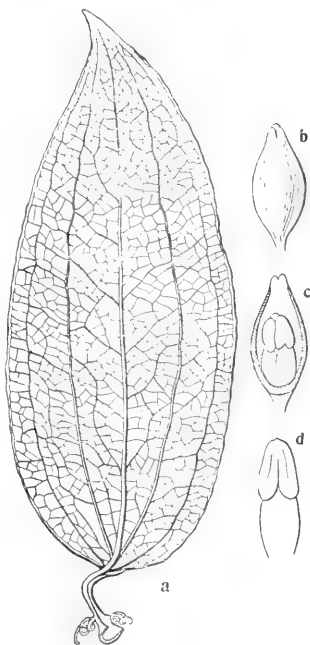


Fig. 83, *Heterosmilax arisanensis* HAYATA; a, a leaf; b, a flower,  $\times 3.5$ ; c, the same, perianth partly taken off, showing stamens,  $\times 3.5$ ; d, a stamen; much more magnified.

HAB. Mt. Arisan : Taroyen, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

Near *Heterosmilax Gaudichaudiana* MAXIM. (DC. Monogr. I. p. 44 and BENTH. Fl. Hongk. p. 370), but differs from it in the much longer peduncles and in the greenish yellow flowers. *H. Gaudichaudiana* MAXIM. has white flowers (after DUNN and TUTCHER Fl. Hongk et Kwangt. p. 277). *H. japonica* KUNTH has an obovoid truncate perianth, while this new species has a fusiformed one.

*Rohdea* ROTH.

***Rohdea Watanabei*** HAYATA sp. nov. (= *Tupistra Watanabei* HAYATA)

Herba. Rhizoma ignotum. Folia circum basin scapi 7-8—conferta lanceolata 40-80 cm. longa 5-7 cm. lata apice modice acuminata basi gradatim longe attenuata ad extremitatem plus minus dilatata se amplectantia sessilia utraque pagine glabra in exsiccato tenuiter coriacea vel chartacea, costis venis venulis in exsiccato utraque pagine elevatis, nervis lateralibus primariis 4—paribus, nervis secundariis inter primarios 4, tesserulis circ. 1 mm. latis 3-6 mm. longis, margine integra, pagina —formiter valde recurva apice fere ad terram attingenti. Scapi inter fasciculos foliorum siti circ. 16 cm. longi, pedunculis 9 cm. longis 4-5 mm. in diametro sectionis teretibus, partibus floriferis 7 cm. longis densissime floriferis glabris sub flore bracteis singulis instructis, bracteis lanceolatis glabris 13 mm. longis 4 mm. latis integris apice acuminatissimis erecto-ascendentibus inter flores valde exsertis basi plus minus contractis. Flores spicatum dense dispositi sessiles in apertienti haud clausi sed patentes. Perianthium late campanulatum crassiusculum, tubo late brevique urceolato-campanulato 3 mm. longo 5-6 mm. lato basi rotundato utroque glabro, lobis 6 bi-seriatim 3—meris imbricatis horizontaliter patentissimis apice plus minus interiore recurvis, exterioribus majoribus utraque pagine glabris rotundato-rhomboidcis 5 mm. longis  $4\frac{1}{2}$  mm. latis apice cuspidato-acutis basi plus minus contractis ad insertionem 3 mm. latis margine crenulato-denticulatis rarius lobatis, interioribus paullo minoribus. Stamina 6 lobis perianthii opposita, filamentis basi lorum perianthii affixis circ. 1 mm. longis basi valde dilatatis, partibus dilatatis cum perianthio perfecte connatis, antheris rotundato-oblongis  $1\frac{1}{3}$  mm. longis  $1\frac{1}{3}$  mm. latis utrinque emarginatis dorsifixis introrsum dehiscentibus. Ovarium globosum glabrum fundo calycis tubi insitum 3-loculare, loculis 2-ovulatis. Bacca oblique globoso-ellipsoidea 12 mm. longa 1—sperma rubescens glabra. Semina matura globoso-ellipsoidea

lata plus minus complanata glabra fuscentia, testa tenuissime membranacea hyalina; albumen copiosissimum fuscens; embryo extremitate albuminis situs linearis  $3\frac{1}{2}$  mm. longus  $\frac{2}{3}$  mm. latus.

HAB. Shintiku: Gakōkitsu, leg. K. WATANABE, (fl. et fr. typ.); in montibus Kappanzan, leg. U. MORI et Y. SHIMADA, Mart. 1910 (fl.); Nantō: Bibyōnaisan, leg. U. MORI, Juli. 1907, (No. 3492, fl.).

The present species is somewhat near to the Japanese congener, *R. japonica* ROTR., in the habit, leaves and in the spikes; but greatly differs from it in the very much longer bracts, in the patent flowers and in the stipitate anthers. Very distinct species.

## Xyrideæ.

### *Xyris* LINN.

HOOK. f. Fl. Brit. Ind. IV. p. 365; BENTH. Fl. Hongk. p. 378; BENTH. et HOOK. f. Gen. Plant. III. p. 842; ENGLER in Pfl.-fam. II-4 p. 20; DUNN et TUTCHER Fl. Hongk. et Kwangt. p. 282.

***Xyris formosana*** HAYATA sp. nov. Herba scirpiformis scapifera, radicibus fibrillosis multissimis. Folia omnia radicalia cœspitosa angustissime linearia plana haud teretia 10–25 cm. longa 1–3 mm. lata apice acuminata basi caulem amplexantia longissime vaginata interdum usque ad medium vaginiformia margine integra haud serrulata crassiuscula sub microscopio ad paginam marginemque minute muricata apice haud aristata. Scapi folia in longitudine valde excedentes vel iis breviores 10–40 cm. longi teretes glabri læves haud ramosi simplices minus vel plus quam 1 mm. in diametro sectionis. Flores ad apicem scapi capitatum siti, capitibus depresso-globosis circ. 1 cm. latis 8 mm. longis apice rotundatis basi truncatis, bracteis rigido-coriaceis obovato-rotundatis 5 mm. longis 4 mm. latis utraque pagine glabris extus valde convexis intus valde concavis apice rotundatis basi late leviter cuneatis ad insertionem 2 mm. latis sursum medio castaneis versus marginem pallidioribus medio crassiusculis ad marginem tenuissimis apice dorso apiculis brevissimis vel obsoletis instructis margine integris intus valde concavis florem unum amplexantibus; bracteolis lateralibus duabus hyalinis tenuissime membranaceis ecoloratis plicatis in explicato obovatis  $4\frac{1}{2}$  mm. longis apice late acutis vel obtusis basi cuneatis dorso medio crasso-

carinatis, (carina dorso acuta), ovarium firme amplexantibus; bracteola anterior tenuissime membranacea hyalina haud carinata longe unguiculata apice dilatata, ungui lineari  $1\frac{1}{2}$  mm. longo  $\frac{1}{4}$  mm. lato tenuissimo, parte dilatata oblongo-triangulari  $1\frac{1}{2}$  mm. longa 1 mm. lata apice cuculliformi basi truncata abrupte ad unguem abeunti alabastrum floris complete involventi; bracteolæ laterales persistentes post anthesin fructus firme amplexantes, sed bracteola anterior caducissima sub anthesin decidua. Perianthii tubus fusiformi-obovoideus 2-3 mm. longus  $1-1\frac{1}{2}$  mm. latus apice rostratus ibique subito expansus ad limbum abeuns, limbo basi campanulato 1 mm. alto, lobis liberis patentibus obovato-rotundatis 3 mm. longis  $2\frac{1}{2}$  mm. latis apice rotundatis basi subacutis margine deorsum integerimis sursum versus apicem denticulatis flavis. Stamina 3 lobis perianthii opposita ad basin loborum adnata, filamentis brevissimis  $\frac{1}{4}$  mm. longis totiusque latis dorso complanatis glabris, antheris late rotundatis  $\frac{1}{2}$  mm. longis latioribus apice profunde 2-lobatis basi cordatis extrorsum deliscentibus, connectivis latis, fasciculis pilorum moniliformium utroque latere basis filamentorum sitis. Ovarium elliptico-obovoideum  $2\frac{1}{2}$  mm. longum apice rotundatum, stylo terminali erecto recto filiformi 2 mm. longo glabro apice 2-fido, ramis erectis  $\frac{2}{3}$  mm. longis apice stigmatosis, stigmatibus dilatatis peltatis  $\frac{1}{3}$  mm. in diametro margine globuloso-ciliolatis. Capsula oblonga 4 mm. longa  $2\frac{1}{2}$  mm. lata facie interiore plana facie exteriori convexa, semi-oblonga in sectione, 3-valvata, valvis hyalinis tenuibus membranaceis. Semina numerosissima fusiformia  $\frac{1}{2}$  mm. longa flavescentia longitudinaliter tenuissime striata, striis castaneis.

HAB. Tōyen, leg. T. KAWAKAMI et T. SŌMA, Oct. 1914.

Closely allied *X. pauciflora* WILLD.; but, as far as is concerned the description of the same species given in BENTH. Fl. Hongk. p. 379, our plant is distinctly different from the Hongkong plant in having outer wingless perianth-segments and inner unguiculate hood-formed ribless segment which is much thinner and hyaline. *X. pauciflora* has "perianth-segments 2 outer narrow and acute, the keel winged; the third broad, but with a rather stiff and prominent midrib."

### Aroideæ.

#### *Pothos* LINN.

*Pothos seemanni* SCHOTT (Fig. 84) MATSUM. et HAYATA Enum. Pl. For-

mos. p. 460.

The following localities of this plant are added to those which I gave in the former publications.

HAB. Urai, Karapin, Kuraru, Bongari, Buisan.

The species is widely distributed in Formosa, northwards from Kelung as south as Kuraru and South Cape; but does not extend to any higher elevation than that of 3000 ft.

**Pothos Warburgii** ENGL. (in Bot. Jahrb. XXV. p. 2) is very likely to be the same species as *Pothos Seemannii*. Judging from the description, I think, the former is a mere form of the latter with a smaller spadix. So far, *P. Seemannii* is the only species of the genus, that we have seen in Formosa.

***Epipremnum* SCHOTT.**

***Epipremnum formosanum* HAYATA sp.**

nov. (Fig. 85). Planta epiphytica vel ad saxum vel truncos repens. Rhizoma repens ubique radicans 1 cm. crassum læve in exsiccato longitudinaliter rugosissimum, rugulis multissimis deformibus, cicatricibus petiolorum distincte notatum, cicatricibus obtriangularibus transverse lunulatis 2 cm. latis 8 mm. longis. Folia membranacea alterna a se 4-5 cm. distantia in ambitu oblonga obovato-vel ovato-oblonga 40 cm. longa 25 cm. lata apice acuta vel acuminata basi late obtusa haud cordata pinnati-loba, sinibus inter lobos inferioribus a costa  $2\frac{1}{2}$  cm. distantibus, lobis utroque latere generaliter 6-10, lobo terminali trapeziformi apice cuspidato-acuto vel acuminato, lobis mediis lineari-triangularibus plus minus falcatis circ. 18 cm. longis basi  $3\frac{1}{2}$  cm. latis apice acuminatissimis basi haud contractis sed latissimis, costulis loborum mediis a costa angulo 40°-50° egressis, sinibus inter lobos obtuso-rotundatis (mediis a costa folii 5 cm. distantibus), venis venulisque distincte reticulatis, petiolis 30 cm. longis semiteretibus intus planis vel concavis extus rotundatis convexis basi dilatatis, partibus dilatatis triangularibus 13 mm. longis basi 2 cm. latis. Pedunculi axillares solitarii.

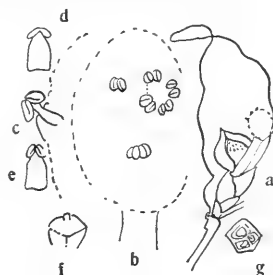



Fig. 84. *Pothos Seemannii* WARB; a, a branch with an inflorescence; b, a spadix, showing a few stamens and an ovary; c, portion of vertical section of the same, showing a stamen in its place; d, a stamen; e, the same, seen from another side; f, ovary; g, the same in cross section.

Alabastrum gemmæ florifera ovato-lineare erectum rectum basi partibus dilatatis petiolorum foliorum fertilium involutum petiolo duplo brevius 15 cm. longum teres 8 mm. in diametro. Spatha spadice brevior basin spadiceis amplexans 13 cm. longa apice convoluto-acuta crassa. Spadix unisexualis cylindricus 11 cm. longus 2 cm. latus apice obtuso-rotundatus deorsum plus minus lator. Flores ♂ densissime horizontaliter dispositi. Stamina generaliter 6, in maturo exserta, filamentis complanatis ovario abortivo firme contactis 1 mm. latis in longitudine variabilibus nigricantibus apice subito contractis, antheris adnatis ovato-linearibus  $2\frac{1}{2}$  mm. longis basi 1 mm. latis. Ovarium abortivum obconico-cylindricum hexagonum in sectione 4-3 mm. longum 4 mm. latum apice truncatum planum ad centrum umbonatum, umbone lineari -formiter recurvo vel subrecto.

HAB. Mt. Arisan: Funkiko ad 5000 ped. alt., ad truncos repens, leg. B. HAYATA et S. SASAKI, Jan. 1912.

The present plant has long been supposed to be identical with the Tonga plant, *E. pinnatum* (LINN.) ENGLER (= *E. mirabile* SCHOTT, in ENGL. Pfl.-reich Heft 37 (IV. 23-B) p. 60, fig. 25). After careful examination in its native locality, I am much inclined to regard the plant as a distinct species which is certainly closely allied to the Tonga plant. Our species has unisexual spadix of which I was able to examine a

male one. The new species differs from *E. mirabile* SCHOTT by the leaves which are oblong in its outline and obtuse but not cordate at the base, and in having unisexual spadix. The plant exists in a forest in Mt. Arisan at elevations of nearly 5000 ft. As to another *Epipremnum* which was also regarded to be the same as *E. mirabile*, I am not in the position to say anything about its identification, as I have not as yet seen the spadix.

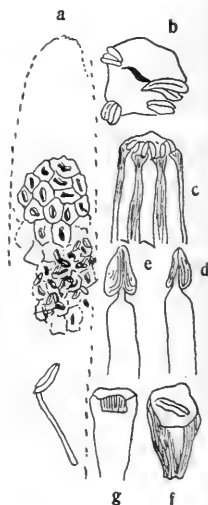


Fig. 88, *Epipremnum formosanum* HAYATA; a, a spadix a little reduced; b, stamens and a rudimentary ovary seen from above; c, the same, seen from side; d, e, a stamen, seen from different sides; f, rudimentary ovary; g, the same in vertical section.



*Arisæma* MART.

***Arisæma brachyspatha*** HAYATA sp. nov. (Fig. 86). Folia cum scapo basi squamis vaginiformibus 3-4 involuta, squamis hyalinis tenuissimis sursum purpureo-maculato-punctatis extimis 3 cm. longis in explicato 18 mm. latis apice rotundatis intimis longissimis 15 cm. longis apice acuminatis basi vaginiformibus. Folia solitaria lamina bipartita, partibus basi a se angulo 80° divaricatis, inter partes foliolo uno sessili instructa, partibus pinnatis vel pinnatifidis, pinnis partis singulæ secundum latere interiore dispositis a se 1 cm. remotis infimis longissimis lanceolatis 9 cm. longis 18 mm. latis apice acuminatissimis sessilibus margine tenuissime purpureo-marginatis minute denticulato-crenulatis, pinnis superioribus minoribus, petiolis 35 cm. longis vaginiformibus, partibus vaginiformibus 30 cm. longis scapum amplexantibus. Scapi singuli cum spatha 35 cm. longi vagina petioli involuti. Spatha suberecta deorsum tubiformis 6 cm. longa in explicato 2 cm. lata, partibus tubiformibus 2-3 cm. longis, lamina 3 cm. longa apice caudato-acuminatissima basi plus minus contracta. Spadix florum masculinorum cylindricus sessilis 1½ cm. longus (exceptis appendicibus) 3½ mm. latus (cum floribus), floribus dense dispositis, appendice suberecta longe exserta plus minus recurva 6 cm. longa basi 2½ mm. lata glabra lævi columnari sursum gradatim attenuata subfiliformi apice viridi. Flores ♂: dense dispositi: stamina 3-aggregata, filamentis brevissimis ½ mm. latis 1/10 mm. longis, antheris reniformibus 2/3 mm. latis ½ mm. longis apice mucronatis basi cordatis 2-ocularibus.

HAB. Fökien: Kozan, leg. S. NAGASAWA, April. 1910, (No. 216).

Near *Arisæma Thunbergii* BLUME, but differs from that by the much shorter not fornicate spathæ which are completely tubiformed towards the base. In *A. Thunbergii*, the spatha is cleft on one side, and the margin of the cleft is imbricate.

***Arisæma consanguineum*** SCHOTT; Hook. f. Fl. Brit. Ind. VI. p. 505.

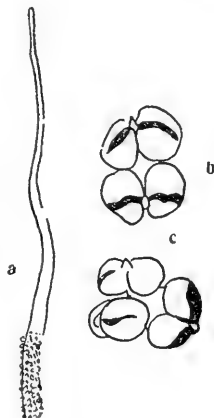


Fig. 86. *Arisæma brachyspatha* HAYATA; a, a male spadix; b, a male flower with two stamens; c, another male flower with three stamens.

*A. rubescens* SCHOTT. var. *consanguineum* ENGL. in DC. Monogr. Phan. II. p. 558.

HAB. Mt. Arisan: Nimandaira, ad 7000 ped. alt.; Heishana, ad 7500 ped. alt.

Tuber valde depresso-globosum 2-2½ cm. latum 1 cm. longum, radicibus facie superiore tuberis radiatim sitis. Petioli folii 60 cm. longi basi cum vaginis 13 mm. lati purpureo-marmorei vel non marmorei, lamina radiatim 10-11-secta, segmentis lanceolatis lineari-lanceolatis vel obovato-lanceolatis 10 cm. longis (exceptis capillis) 2 cm. latis apice subito acuminatis ad apicem capillis tenuissimis 7 cm. longis instructis basi attenuatis margine subintegris vel remote serrulatis interdum purpureo-marginatis tenuiter herbaceis. Pedunculi spadiceis 18 cm. longi in longitudine dimidium petioli aequantes parte vaginiformi petioli inclusi sursum liberi. Spatha cum tubo laminaque (exceptis capillis) 13 cm. longa circ. 4 cm. (in lamina) lata, tubo cylindrico latere uno usque ad basin fissio convoluto basin angustato haud ventricosus 5 cm. longo ore subtruncato, lamina ad medium fornicata basi margine recurva apice subito acuminata ad capillum 23 cm. longum abeunti multi-nervia intus viridi vel fusco-purpurea albo-striata. Spadix floris masculinus: parte florifera cylindrica 3 cm. longa circ. 5 mm. lata sursum latior, appendice clavato-columniformi 3 cm. longa 8 mm. lata apice rotundato-clavata deorsum leviter angustiori a tubo spathæ vix exserta lævi ad apicem alba vel atro-purpurea vel interdum toto viridi; flores ♂: laxè dispositi; stamina 2, filamentis brevissimis se connatis, antheris reniformibus 2-locularibus, loculis purpureis sub microscopio minute tuberculatis; pollina purpurea. Spadix floris feminei: parte florifera 1 cm. longa vel longiore ovoideo-conica basi 11 mm. lata apice 3 mm. lata, appendice 4½ cm. longa sursum latiore deorsum angustiore vel ± contracta apice lævi vel minute tuberculata deorsum remote laxèque setulosa, setulis mollis 2 mm. longis; appendice in colore variabili. Bacca sanguineo-rubra polygono-oblonga 1 cm. longa 6 mm. lata 4-sperma. Semina polygona facie plana dorso rotundata ad extremitatem altram acuta et caudata ad altram extremitatem truncata umbonata alba, testa membranacea; albumen copiosum osseum; embryo centro albuminis situs spathuliformis 3 mm. longus, cotyledone complanata plana 1½ mm. lata.

The description of the fruit above given is drawn from a specimen found at a place where *A. consanguineum* grew. The fruit-bearing specimen having

no leaf, it is a little doubtful if it really belong to the same species. Either type or original description I have never seen. So far as the description given by HOOKER is concerned, our plant is highly probably referable to this species. The above description is drawn up from a set of perfect specimens collected in Mt. Arisan.

***Arisæma formosana* HAYATA n. n.** (Fig. 87). *Arisæma alienatum* SCHOTT var. *formosana* HAYATA Mater. Fl. Formos. p. 371.

Very near *A. alienatum* SCHOTT. (= *A. concinnum* SCHOTT Bot. Mag. t. 5914); but differs from it by the very much more slender appendix, and by the much more densely arranged male and female flowers.

HAB. Mt. Arisan: a Funkiko usque ad Arisan, 4700–7500 ped. alt., leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

The original specimen of *Arisæma alienatum* var. *formosana* HAYATA is rather imperfect and therefore it is at present difficult to identify the present plant with the original; but in all probability, I think the *Arisæma* in question is identical with the former. As the original description is based upon an imperfect specimen, it is my desire to give here another exhaustive description drawn from perfect material. The segments of the leaves are very variable in number, shape and size. They vary from 7 to 11, from lanceolate to narrow linear, from 8 cm. to 25 cm. in length and from 4 mm. to 4 cm. in breadth. Petioles are sometimes snake-colored, but sometimes are not at all maculated. The appendices of the spadix are usually softly setose, but sometimes quite smooth.

Tuber depresso-globosum 25 cm. in diametro 1 cm. longum, radicibus facie superiore tuberis sitis. Folia singula, petiolo 76 cm. longo basi cum vaginis 15 mm. lato purpureo-marmoreo, vaginis 2–3 dispositis tenuiter membranaceis, lamina radiatim 13–secta (interdum 7–11), segmentis lanceolatis vel obovato-lanceolatis 20 cm. longis 4 cm. latis apice caudato-acuminatis (acuminibus 1–2 cm. longis apice filiformibus) basi gradatim attenuatis

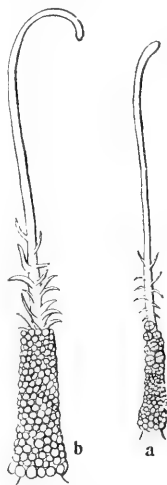


Fig. 87, *Arisæma formosana* HAYATA; a, a male spadix; b, a female spadix.

tenuissime membranaceis. Scapi petiolo breviores 50 cm. longi in partibus majoribus vagina petioli involuti. Spatha deorsum cylindrica latere uno ad basin fissâ erecta supra medium fornicata sursum viridis albo-striata ad apicem longe acuminata ad capillum 13 mm. longum abeuns supra medium alba infra medium fusco-purpureo-striata alba. Spadix (floris masculini) cylindricus deorsum latior exceptis appendiculis 2 cm. longus sessilis basi cum floribus 4-5 mm. latus apice 3 mm. latus, appendice 4 cm. longa lineari-filiformi  $\pm$  recurva deorsum latiore 1 mm. lata molle setosa (setis mollis  $1\frac{1}{2}$  mm. longis horizontaliter vel descendente patentibus), sursum viridi angustiore apice  $\frac{1}{2}$  mm. lata. Flores dense dispositi: stamina 2-aggregata, filamentis brevissimis  $\frac{1}{3}$  mm. longis, antheris brevissime apiculatis vel non apiculatis 2-locularibus, loculis globosis; iis staminum inferiorum minoribus  $\frac{1}{3}$  mm. latis, iis staminum superiorum majoribus  $\frac{2}{3}$  mm. latis. Spadix floris feminei cylindricus 2 cm. longus (exceptis appendicibus) sessilis basi latior 1 cm. latus sursum angustior 5 mm. latus, appendice 7 cm. longa viridi deorsum latiore setosa, setis mollis horizontaliter vel descendente patentibus 3-4 mm. longis teretibus. Flores ♀ dense dispositi; ovaria obcuneata 2 mm. longa apice truncato-conica rhomboidea, stigmatibus apiculiformi. Pollina purpurea.

**Arisæma formosana** HAYATA forma. **stenophylla**. Folii laminæ radiatim 11-sectæ, segmentis linearibus 25 cm. longis 6 mm. latis apice acuminatissimis basi attenuatis tenuissime membranaceis; spatha quam spadice angustior. Bacca subviridis vel flavescens viridis depresso-hexagona vel trigona apice late truncata hexagona vel trigona apice 6-7 mm. in diametro 6-7 mm. longa. Semina rubra polygonica 3 mm. longa  $2\frac{1}{2}$  mm. lata.

HAB. Mt. Arisan, leg. S. SASAKI, Mai. 1913, (No. 5).

**Arisæma grapsospadix** HAYATA sp. nov. (Tab. XVII.). Tuber oblongo-ovoideum 4-5 cm. longum 2-2 $\frac{1}{2}$  cm. latum plus minus recurvum, radicibus ad totam faciem sitis filiformibus eramosis. Folia geminata vel ternata, alterum longius alterum brevius vel æquilongum, basi petioli squamis vaginiformibus 2-3 involuta, petiolis basi vaginiformibus, partibus vaginiformibus se amplectantibus 30-35 cm. longis usque ad basin fissis apice rotundatis infra apicem dorso partes teretes petiolorum emittentibus, partibus teretibus petiolorum 11 cm. longis, lamina trifoliolata, foliolo terminali ovato-lanceolato vel oblongo-lanceolato

15 cm. longo  $4\frac{1}{2}$  cm. lato apice subito acuminato ad apicem arista 2 mm. longa instructo basi obtuso vel cuneato-attenuato margine minute crispulato, costa subtus elevata supra plana, venis primariis 10-12 subrectis angulo  $50^\circ$  a costa egressis prope marginem vena marginali primaria junctis, vena marginali primaria a margine 3 mm. remota, vena marginali secundaria a margine  $\frac{1}{3}$  mm. remota, tenuiter membranaceo, petiolulo  $2\frac{1}{2}$  cm. longo; foliolis lateralibus eo terminalo paullo brevioribus 13 cm. longis 4 cm. latis cum foliolo terminali conformibus sed basi valde obliquis, latere interiore acuto 18 mm. lato, latere exteriore rotundato 22 mm. lato, petiolulis brevioribus 5 mm. longis. Pedunculi spadiceis 40-45 cm. longi vagina petioli involuti sursum liberi. Spatha cum lamina  $10\frac{1}{2}$  cm. longa sursum atro-viridis basi laminae areolis albis notata, (areolis late transverse lunatis  $2\frac{1}{2}$  cm. latis), deorsum viridis prope basin albicans, tubo 6 cm. longo 3 cm. lato ore subtruncato latere uno usque ad basin fisso, lamina supra medium fornicata (in explicato) triangulari 4 cm. longa basi 3 cm. lata apice triangulari-acuta ad apicem arista 2 mm. longa instructa. Spadix floris masculini cum appendice 9 cm. longus, parte florifera 3 cm. longa cum floribus 3-4 mm. lata laxè florata, appendice 6 cm. longa filiformi deorsum levi-purpureo-viridi supra medium usque ad apicem fusco-viridi apice subulata subrecta vel subrecurva infra apicem setis mollis 3 mm. longis densiuscule disposita, partibus setigeris  $1\frac{1}{2}$  cm. longis. Fl. ♂ : laxiuscule dispositi; stamina 3 aggregata, filamentis brevissimis se connatis  $\frac{1}{2}$  mm. longis, antheris purpureis 2-locularibus, loculis globosis  $\frac{1}{2}$  mm. in diametro; pollina albicantia. Spadix floris feminei: spadiceis pars florifera 27 mm. longa cum floribus 5 mm. lata, appendice basi interdum flores masculinos 2-3 gerenti; fl. ♀ : densiuscule dispositi; ovaria 6-ovulata oblique obovoidea sessilia ascendente sita 3 mm. longa 2 mm. lata lævia, stylo  $\frac{1}{2}$  mm. longo, stigmate terminali truncato. Bacca dense disposita oblique conico-ovoidea latere  $\pm$  complanata apice conico-acuta rubra 2-3-sperma. Semina conica apice conico-acuta vel acuminata basi truncata vel concava ad centrum umbonata vel bilateralia facie plana dorso rotundata, testa membranacea in exsiccatò elevato-reticulato-rugulosa, albumen osseum.

HAB. Arisan, inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. HAYATA et T. Itō, Mart. 1914 (fl.); ibidem leg. B. HAYATA et S. SASAKI, Jan. 1912, fructus!

Closely allied to *A. laminatum* BLUME (BENTH. Fl. Hongk. p. 342); but differs from it by the petiolate leaflets and by the lamina of the spathe ending with a very short arista of 2 mm. in length. Also near *Arisema penicillatum* N. E. BROWN (in Journ. Linn. Soc. Bot. XVIII. (1881) p. 248, t. 5), but distinguishable from it by the very oblique ovoid ovary which are ascendingly arranged and in having the spadix with the dark green penicillate apex.

***Arisema kelung-insularis*** HAYATA sp. nov. (Fig. 88). Tuber...Folia singula, lamina in ambitu rotundata radiatim 11-partita, segmentis longe linearibus 30-35 cm. longis  $1\frac{1}{2}$  cm. latis apice longe filiforme acuminatis basi attenuatis margine integris tenuissime herbaceis, petiolis 40 cm. longis teretibus deorsum purpureo-marmoreis basi vaginatis scapum amplexantibus. Pedunculus floris feminei 18-20 cm. longus. Spatha basi tubiformis fornicata 15 cm. longa in explicato ad orem 4 cm. lata apice caudata (caudis apice filiformibus) sursum viridis albo-striata. Spadix cylindricus 22 cm. longus (exceptis stipitibus appendiculisque) 9 mm. latus utrinque truncatus dense ovariifer, stipite 15 mm. longo basi dilatato subconico basi 1 cm. in diametro, appendice clavato-cylindrico-columniformi 5-6 cm. longa sursum latiore deorsum minus lata basi 2 mm. in diametro sursum 3-4 mm. in diametro medio deorsum setosa, setis mollis 7 mm. longis ascendentibus, a medio sursum levi apice rotundata. Fl. ♀: ovaria obconica sessilia hexagoniformia dense disposita; stigmata punctiformia.

HAB. Ins. Kelung, leg. S. SASAKI, Mai. 1910.

Near *Arisema formosana* HAY., but differs from it by the appendices of the spadices which are much thicker and rod-formed.

***Arisema ringens*** SCHOTT.; MATSUM. et HAYATA Enum. Pl. Formos. p. 457.

HAB. Kelung, leg. B. HAYATA et S. SASAKI, Juni. 1912.

***Arisema Takeoi*** HAYATA sp. nov. Tuber depresso-globosum 2 cm. longum 3 cm. latum per totam faciem radici-ferum. Folia solitaria, petiolis 68 cm. longis basi squamis paucis obtectis, lamina pedatim 2-partita, partibus a se angulo 90° egressis circ. 10 cm. longis unilateraliter segmentiferis, segmento singulo



Fig. 88,  
*Arisema kelung-insularis*  
HAYATA; a,  
a female spadix.

centrali inter partes sito lanceolato 11 cm. longo 3 cm. lato apice acuminato ad summum breve aristato basi cuneato sessili, segmentis partium singularum 11, infimis longissimis superioribus gradatim brevioribus superrimis ad 3 cm. reductis, infimis longissimis oblanceolatis 20 cm. longis  $3\frac{1}{2}$  cm. latis apice acuminatissimis (acumine lineari) integris herbaceo-membranaceis basi cuneato-attenuatis, inferioribus a se 3 cm. remotis. Scapi 80 cm. longi ad  $\frac{2}{3}$  longitudinem vaginis petiolorum involuti medio 8 mm. crassi glabri. Spatha a basi usque ad medium tubiformis sursum limbiformis inter limbum et tubum plus minus constricta, tubo 6 cm. longo 13 mm. lato latere uno fisso, limbo ovato-oblongo 6 cm. longo 3 cm. lato plus minus procurvo apice acuminato basi constricto cum tubo leviter viridescenti. Spadix ♂ toto glaberrimus lævissimus stramineus teres apice longissime filiformis cum filis 30-40 cm. longus basi florifer, parte florifera 4 cm. longa 4 mm. lata. Flores ♂ densiuscule dispositi, antheris 2-3 subsessilibus 2-ocularibus, loculis globosis  $\frac{1}{3}$  mm. in diametro.

HAB. Taihoku: Kinkwaryō, leg. TAKEO ITō, Mai. 1915.

Near *A. Thunbergii* BLUME; but distinguishable from it by the spathas which in this new species are slightly greenish, and very much contracted between the limbs and tubes, without making any reflexed margin at the mouth of the tubes.

### *Colocasia* LUDW.

***Colocasia kotōensis*** HAYATA sp. nov. Rhizoma teres versus apicem  $1\frac{1}{2}$  cm. crassum reliquis petiolorum dilatis obtectum. Folia ad apicem rhizomatis 4-5 fasciculatim sita longe petiolata, lamina triangulari-ovata 17 cm. longa 14 cm. lata apice triangulari-acuta basi profunde cordata, lobis cordis auriculiformibus divaricatis angulo 60-90° a se egressis apice obtusissimis vel rotundatis (sinibus cordis triangularibus), margine integra crassiuscule membranacea, venis venulis parallelis, venulis secundariis minute tessellatis, utraque pagine glaberrima, petiolis 20-25 cm. longis glabris sursum teretibus deorsum vaginiforme dilatatis ad basin extremitatis subito dilatatissimis, partibus dilatatissimis triangularibus 2 cm. longis totiusque latis vel latioribus rhizoma semi-amplexantibus. Scapi cum spadice 20-25 cm. longi glabri. Spatha late obovato-oblonga 9 cm. longa 6 cm. lata dextrorsum convoluta in convoluto 3 cm. lata cylindrica apice acuta

spadicem complete obtegens glabra. Spadix sessilis cum parte apicali appendiculata (neutrali) 7 cm. longus tereto-clavatus basi oblique cum basi spathæ junctus, partibus ovariiferis a basi usque ad medium spadicis extensis 4 cm. longis cylindricis apice basique breve attenuatis medio latissimis 9 mm. latis a basi usque ad  $\frac{3}{4}$  cum ovariis corpora pauca gerentibus sursum sole ovaria gerentibus, partibus antheriferis a medio sursum usque ad  $\frac{3}{4}$  altitudinem extensis 17 mm. longis 12 mm. latis quam parte ovariifera latoribus, partibus appendiculatis a  $\frac{3}{4}$  altitudine sursum usque ad apicem spadicis extensis 2 cm. longis  $1\frac{1}{2}$  cm. latis apice obtusissimis. Fl. ♂ dense dispositi, staminodiis inter flores nullis. Syandrium liberum 2-staminale, filamentis  $1\frac{1}{2}$  mm. longis 1 mm. latis complanatis glabris crassissimis rubro-punctatis facie interiore a basi usque ad medium se connatis, antheris liberis haud connatis filamento æquilatis æquicrassis 1 mm. longis paullo plus quam 1 mm. latis apice truncatis dense fusco-punctatis ad centrum apicis mucronibus singulis obtusis instructis. Corpora versus apicem spadicis dense disposita clavata 2-3 mm. longa 1 mm. lata 2-3 se connata crassa rubro-punctata. Fl. ♀: ovarium paullo oblique ovoideum cum stigmate  $1\frac{1}{4}$  mm. longum  $\frac{3}{4}$  mm. latum glabrum apice brevissime rostratum apice stigmatosum haud punctatum, stigmate truncato rubescenti, 1-loculare ∞-ovulatum, placentis 2-3 parietalibus, ovulis ∞ orthotropis ab apice funiculorum pendulis, funiculis longiusculis ascendentibus. Corpora inter ovaria inferiora disposita claviformia  $1\frac{1}{4}$  mm. longa apice globosa.

HAB. Kōtōshō, leg. Y. TASHIRO, Aug. 1914.

Near *Colocasia antiquorum* SCHOTT., but quite distinguishable from it by the spadices which are entirely wanting the neutral portions between stamiferous and ovariiferous portions, and by the quite obtuse conical appendices.

## Alismaceæ.

### *Lophotocarpus* DURAND.

"Ind. Gen. Phaner. (1888) p. 627." BUCHENAU Alismataceæ in ENGLER Phil.-reich p. 35. = *Lophiocarpus* MIQ. "Ill. Fl. de l' Archipel Indien (1870) p. 50, (nec TURCZ. in Bull. Soc. Natur. Mosc. XVI. (1843) p. 55, Genus Chenopodiacearum)."

The original description of this genus is not accessible to me. BUCHENAU



remarks in his monograph, "flores polygami (hermaphroditi et masculini), stamina 9 usque 12 cetera ut in *Sagittaria*.... Plantæ submersæ fluitantes; folia longe petiolata, lamina in superficie aquæ natans, ovalis basi profundo excersa (laminae *Nymphaearum* similis); flores emersi." Our species exactly agrees with this genus, but for its having invariably hermaphrodite flowers. It may be well inferred, however, that polygamous flowers may be found in the Formosan species when rich collections of the same plant are examined.

**Lophotocarpus formosanus** HAYATA sp. nov. Herba aquatica acaulis. Folia omnia radicalia fasciculatim disposita, petiolis 15–20 cm. longis medio 5 mm. latis apice valde angustatis 1–2 mm. latis glabris, lamina rotundata vel triangulari circ.  $3\frac{1}{2}$  cm. longa totiusque lata apice obtusissima vel rotundata basi profunde cordata, lobis cordis  $1\frac{1}{2}$ –2 cm. longis apice acutis vel obtusis vel rotundatis plus minus divaricatis, sinibus cordis latis triangularibus, margine integra membranacea palmati-nervia utraque pagine glabra subtus pallida minute punctata. Scapi a centro fasciculi foliorum oriundi 10–15 cm. longi aphylli apice flores umbellatim vel cymosim 2–3 gerentes. Umbellæ (vel cymæ) 2–3-floratae basi involucri suffultæ, involucri tenuiter membranaceo campanulato 7 mm. longo apice totiusque lato apice 3–4 lobato, lobis triangularibus obtusis; radiis umbellarum vel pedicellis florum 5 mm. longis validiusculis glabris erectis. Sepala 3 ovata 7 mm. longa 5–6 mm. lata apice obtusissima basi haud vel vix contracta ad basin  $3\frac{1}{2}$ –4 mm. lata margine hyalina tenuissima integra glabra. Petala tenuissima post anthesin evanescentia 7 mm. longa cum sepalis æquilonga 5–6 mm. lata apice late rotundata basi fere rotundata ad insertionem  $\frac{1}{2}$  mm. lata. Stamina 9, filamentis complanatis 2 mm. longo, anthera adnata oblonga 1 mm. longa apice acuta. Carpella  $\infty$ , receptaculo 3 mm. longo  $2\frac{1}{2}$  mm. lato ellipsoideo apice obtuso basi haud contracto; carpello cum stylo 1 mm. longo; ovario semi-oblongo glabro. Achænia valde complanata oblique oblonga 3 mm. longa 2 mm. lata margine grosse dentata, (dentibus  $\frac{1}{2}$  mm. longis  $\frac{1}{3}$  mm. latis apice truncatis vel obtusis complanatis), facie paucissime muricata vel sublaevia apice stylo dentiformi truncato oblique coronata; albumen O; embryo oblique U-formiter recurvus, partibus recurvatis firme se contactis.

HAB. Tōyen, leg. S. SASAKI, Sept. 1908; Biōritsu, Taiko, leg. Y. SHIMADA, Aug. 1907, (No 4209).

Our plant differs from its allied species *L. guyanensis* in wanting male flowers and in other not very important points.

*Sagittaria* LINN.

**Sagittaria pygmæa** MIQ. Prol. Fl. Jap. p. 138. "Folia lineari-subspatulata, parte suprema paullo latiore acutiuscula trinervula laminam pro pariam fere referente. Scapus folia vix superans subumbellato-pauciflorus monoicus, floribus masc. cum fem. sessili vulgo geminis graciliter pedunculatis, axis continuatione tanquam tertio pedicello apice paucifloro (masc. ?); fl. masc. circiter 12-andri."

HAB. Biōritsu: Taiko, leg. Y. SHIMADA, Aug. 1907, (No. 4208).

Compared with a Japanese specimen in the Tōkyō herbarium. Our plant accords tolerably well with the original description of MIQUEL. Leaves of the species have no blade, but petiole broadened like a phyllode. It is, to some extent, comparable with *Sagittaria sagittifolia* and may be regarded as a variety of the latter. In my opinion, however, it is more reasonable to regard our plant as specifically distinct from *S. sagittifolia*, as this form wanting leaf-blades is pretty constant and is always found to have sessile female flowers.

Gramineæ.

*Phyllostachys* SIEB. et ZUCC.

**Phyllostachys Makinoi** HAYATA sp. nov. *Phyllostachys bambusoides* HACKEL in Bull. Herb. Bois. VI. (1904) p. 529, (non SIEB. et ZUCC.); MATSUM. Ind. Fl. Jap. II-1, p. 92, pro parte; MATSUM. et HAYATA Enum. Pl. Formos. p. 549. Arborescens 10-20 m. alta; culmus rectus in specimine adulto nostro ad 1 m. altitudinem haud sulcatus in sectione perfecte circularis 6.5 cm. in diametro in exsiccatō pallido-fulvescens. Merithallium (internodium) in specimine ipse 16 cm. longum. Lignum 8 mm. crassum. Canalis medullaris 47 mm. in diametro. Nodus tenuiter prominens. Inferior pulvillus tenuis 1 mm. elevatus acute annularis. Cicatrix vaginae haud conspicua. Superior pulvillus tenuissimus haud distinctus obtusissimus sensim elevatus a pulvillo inferiore 5 mm. distans. Culmus rami hornotini facie cera alba complete obtectus. Squama bicarinata ramum vel ramulum semi-amplexans in specimine nostro oblongo-ovata chartacea pallido-fulvescens 18 mm. longa 7 mm. lata apice obtusissima basi ra-

mulos amplexans glabra bicarinata, (carinis a margine 3 mm. distantibus), a basi usque ad medium fissa apice haud fissa. Vagina ramuli (vel perula) ad basin ramuli foliiferi 2-3-seriatim sita, superrima (intima) basi ramulum firme amplexans elongato-elliptica 9-10 mm. longa 5 mm. lata utraque pagine glabra apice rotundata ad summum cuspidata, cuspidē  $\frac{1}{2}$  mm. longa, intus nitida margine interdum ciliolata. Ramuli foliiferi graciles, nodis prominentibus pulvillis superioribus et inferioribus 1-2 mm. se distantibus, superioribus quam inferiore plus prominentibus, latere uno late sulcati vel subplani glabri. Folii vaginella 25-30 cm. longa 1-1 $\frac{1}{2}$  cm. lata extus subglabra latere fesso imbricata ciliata, ore obliquo dense hirsuto; setæ auriculares (vel pili auriculares) 6 mm. longæ scabræ utroque latere oris 5-10 dispositæ; ligula cylindrica 2 mm. longa ore denticulata extus hirsuta intus glabra latere uno fesso se imbricato; folii lamina lanceolata 10-12 cm. longa 17 mm. lata apice acuminatissima basi cuneato-attenuata ad petiolum abeuns, margine latere uno aristato-denticulata, latere uno haud denticulata integra, supra glabra, subtus basi ad costas hirsuta; nervi secundarii 5-6-parii, nervuli inter secundarios 9; tessellæ 28 in 5 mm.; denticulis 7 in 5 mm.; petiolis 5 mm. longis 1 $\frac{1}{2}$  mm. latis glabris.

HAB. In partibus mediis Formosæ ubique culta.

The present plant is one of the most abundantly planted species of the Bambusaceæ in the middle part of Formosa. The species was regarded for some time past to be identical with *Phyllostachys bambusoides* SIEB. et ZUCC. The first botanist who recorded our plant under the same name from Formosa is E. HACKEL. In 1904, in his *Supplementa Enumerationis Graminum*<sup>1)</sup>, this eminent authority reported “\**P. bambusoides* SIEB. et ZUCC. in Abh. Acad. Münch. III. p. 745, in montibus prope Kelung, FAURIE 765” with a note “die mit \* bezeichneten Arten und Varietäten sind für die Flora der betreffenden Länder neu.” In 1905, Professor MATSUMURA, referring to HACKEL’s paper, mentioned the occurrence of the species in Formosa in his *Index Plantarum Japonicarum*<sup>2)</sup>. Later on, in 1906, when I was working our *Enumeratio Plantarum Formosinarum*<sup>3)</sup> in conjunction with the said professor, I examined one of the specimens

1) HACKEL, E.—*Supplementa Enumerationis Graminum Japoniæ, Formosæ, Coreæ*, in Bull. Herb. Bois. VI. (1904) p. 529.

2) MATSUMURA, J.—*Index Plantarum Japonicarum* II.-1, p. 92.

3) MATSUMURA, J. et HAYATA, B.—*Enumeratio Plantarum Formosinarum*, p. 549.

of the Père FAURIE, which bears the same number as that was sent to HACKEL. As it appeared to me very much the same as the Japanese *P. bambusoides*, I followed HACKEL and adapted the same name for the Formosan plant. But, I did not go to any further examination, until I was suggested, by several botanists in Formosa, of the difference between the Japanese and Formosan. Examining closely, I have found that they are quite distinguishable even by a single piece of a leaf. In his elaborate and nearly exhaustive monograph of the Bambusacæ, which brings our knowledge of the family up to date, CAMUS<sup>1)</sup> enumerates five species of A-group to which *P. bambusoides* belongs, viz:—1, *P. bambusoides*; 2, *P. puberula*; 3, *P. Veitchiana*; 4, *P. montana*; 5, *P. pubescens*. Of these species, our plant bears the closest resemblance to the first species. The new plant is distinguishable from *P. bambusoides* by the very thin ceraceous coat covering the culms and branches of a newly grown plant, by the shorter and much obtuser bicarinate scales at the base of the branchlets, by the much broader shortly cuspidate perules, by the much more hirsute mouth of the leaf-vagina, by the longer hirsute ligules and by the leaf-blades, which are in our plant much more cuneate at the base. In *Phyllostachys bambusoides*, the newly grown culms are not coated with a ceraceous matter, the bicarinate scales are more narrower and acuter, the perules are narrower and acute, the leaf-vaginæ are less hirsute, the ligules are much shorter, and above all the leaf-blades are more or less rounded at the base, which in the new species are always cuneate at the base, but never rounded. The two species are most easily distinguished by the base of the leaves.

### Lycopodiaceæ.

#### *Lycopodium* LINN.

***Lycopodium quasipolytrichoides* HAYATA sp. nov.** (Fig. 89). Rhizoma (vel in sensu vero caulis repens) supra-terraneum versus basin radices emittens dense foliatum. Caulis (vel in sensu vero ramus) erectus e caule repenti remote oriundus a se 1–2 cm. remotus a basi vel supra medium sursum 2–4-plo furcato-ramosus circ. 10 cm. longus cum foliis valde deorsum reflexis 3–5 mm. latus,

1) CAMUS, E.G.—Les Bambusées, Monographie, Biologie, Culture, Principaux Usages. Paris (1913).

foliis densiuscule dispositis. Sporangia axillaria solitaria sessilia transverse semi-lunularia vel latissime reniformia plus quam 1 mm. lata  $\frac{2}{3}$  mm. longa 2-valvata basi ad centrum brevissime stipitata, stipitibus  $\frac{1}{10}$  mm. longis.

HAB. Mt. Arisan, ad 7500 ped. alt., Aprili. 1914, leg. TAKEO ITÔ et B. HAYATA.

Our plant agrees pretty well with *Lycopodium lucidulum* MICHX. The description of the species in BAKER Handb. Fern-all. p. 11 is as follows :—"Stems suberect,  $\frac{1}{2}$ -1 ft. long, 1-3 times dichotomously forked  $\frac{1}{2}$ - $\frac{3}{4}$  in. diam. including leaves. Leaves moderately crowd, lanceolate, bright green, firm in texture, glossy, entire,  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, unequal, upper spreading, lower reflexed, midrib distinct. Sporangia in irregular zones in the axiles of shorter leaves interspersed



Fig. 89, *Lycopodium quasipolytrichoides* HAY.  $\times \frac{1}{2}$ .

with the longer ones all down the stem. HAB. Canada, New Foundland and United States, Japan, China ; Himalaya of Sikkim "

But our plant is a little different from the said species in the much smaller form having the leaves with very obscure midrib, which in *L. lucidulum* is

(after BAKER) distinct. Remarkable for its very slender erect stem with the leaves all very reflexed downwards.

***Lycopodium reflexo-integrum*** HAYATA sp. nov. (Fig. 90). Rhizoma repens. Caulis caespitosus circ. 10 cm. longus (foliis toto longitudine dense spiraliter dispositis) cum foliis 1 cm. latus foliis exceptis 2 mm. latus teres glaber. Folia omnia conformia lanceolata linearia  $3\frac{1}{2}$  mm. longa medio  $\frac{1}{2}$  mm. lata apice acuminata basi latissima margine integra glabra extus supra tenuiter carinata intus supra plana valde deorsum reflexa. Sporangia ad axillas foliorum superiorum sita limbo - reniformia  $1\frac{1}{2}$  mm. lata 1 mm. longa glabra brevissime stipitata, stipitibus latiusculis  $\frac{1}{4}$  mm. latis  $\frac{1}{10}$  mm. longis; partibus caulibus sporangiiferis 5 mm. longis infra gemmam apice alem generaliter locatis.



Fig. 90, *Lycopodium reflexo-integrum* HAYATA  $\times \frac{9}{7}$ .

HAB. Mt. Arisan, leg. T. SŌMA, Dec. 1915.

**Lycopodium Somai** HAYATA sp. nov. (Fig. 91). Caules cespitosi 5 cm. alti 1-2-plo ramosi cum foliis 4-5 mm. lati deorsum  $1\frac{1}{4}$  mm. in diametro sectionis deorsum pallidi sursum miniati, ramis simplicibus teretibus glabris, foliis toto longitudine densiuscule spiraliter dispositis. Folia omnia conformia inferiora lineari-lanceolata 3 mm. longa medio  $\frac{1}{2}$  mm. lata apice acuta subteretia breve aristata nitida rubescentia basi complanata latissima plus quam  $\frac{1}{2}$  mm. lata plus minus rubescentia medio minus complanata viridia margine integerrima supra nitida subtus pallidiora utraque pagine convexa subtus plus minus carinata margine rubescentia. Folia superiora quam inferioribus breviora 2 mm. longa  $\frac{1}{2}$  mm. lata utraque pagine apice basique plus



Fig. 91; *Lycopodium Somai* HAYATA,  $\times 10$ .

rubescentia medio solum viridia margine miniato-rubescentia. Caulis medio sursum toto longitudine sporangiifer. Sporangia axillaria reniformia  $1\frac{1}{4}$  mm.  $1\frac{3}{4}$  mm. longa brevissime stipitata.

HAB. Mt. Arisan, leg. T. SŌMA, 1915.

Near *L. lucidulum* MICHX., but separable from it in having much smaller leaves and smaller sporangia.

## Marattiaceæ.

*Archangiopteris* CHRIST et GIESENHAGEN.

Flora (1899) pp. 72-77; ENGLER u. PRANTL Natur. Pfl.-fam. I-4, p. 439.

**Archangiopteris Somai** HAYATA sp. nov. Rhizoma.....Stipes circ. 50 cm. longus plus minus squamatus, squamis lanceolatis membranaceis 2-3 mm. longis. Frons in circumscriptione ovata 40 cm. longa 25 cm. lata pinnata, pinnis in specimine nostro 4, pinna terminali lanceolata 30 cm. longa 6 cm. lata apice subito acuminatissima, acumine lineari basi 3-4 mm. lato, basi obtusa, petiolulo 1 cm. longo, margine a basi usque ad prope acumen regulariter crenulata, crenulis  $\frac{1}{2}$  mm. longis 1 mm. latis, ad basin acuminis dentata, dentibus ascendentibus apice obtusis  $1\frac{1}{2}$  mm. longis, utraque pagine glabra supra viridissima subtus pallidissima, venis lateralibus simplicibus vel a basi furcatis, venulis parallelis a costa circ. angulo  $90^\circ$  divaricatis plus minus superiore recurvis a se 2-3 mm. remotis simplicibus distinctis haud elevatis haud impressis ad marginem fere attingentibus vel prope marginem evanescentibus apice haud clavatis; textura crassiuscule herbacea vel crassiuscule membranacea; pinnis lateralibus cum terminali conformibus sed paullo minoribus; pagine sub soro plus minus pilosa; costa pinnae supra plana subtus plus minus elevata.

HAB. Rahao, Dec. 1910, leg. T. SŌMA.

Resembles *Archangiopteris Henryi* CHRIST et GIESENHAGEN in having simply pinnate fronds with linear sori; but differs from it by the very shortly stipitate pinnae with very much longer tails at the apex, and in the sori which in our species are located much nearer to the costa than to the margin. Stipules on the stipes or those on the pinna-petioles are not yet seen in our specimen. A full description and illustration will be given in the next volume.

## Hymenophyllaceæ.

*Hymenophyllum* LINN.

**Hymenophyllum crispato-alatum** HAYATA sp. nov. Rhizoma repens. Stipes 6-10 cm. longus a basi usque ad medium teres a medio sursum alatus cum alis 2 mm. latus, alis  $\frac{2}{3}$  mm. latis, glaber. Frons ovato-lanceolata vel lanceolata 14-22 cm. longa  $3\frac{1}{2}$ -6 cm. lata apice acuminata basi in ambitu truncata



bipinnatifida, segmentis I. mediis vel inferioribus longissimis, infimis brevioribus superioribus gradatim brevioribus minoribus, mediis oblongis 3 cm. longis  $1\frac{1}{2}$  cm. latis apice obtusis basi latissimis latere superiore truncatis latere inferiore cuneatis, segmentis II. infimis mediis obovato-cuneatis apice obtusissimis basi cuneatis 8–9 mm. longis 5 mm. latis pinnatis, lobis linearibus apice obtusis 3–4 mm. longis 1 mm. latis; textura tenuissime membranacea glabra semihyalina; rhachis alata, cum alis 2 mm. lata, alis  $\frac{2}{3}$  mm. latis valde undulato-crispatis; rhachis segmentorum I. alata cum alis 2 mm. lata, alis partibus inferioribus undulato-crispis; segmentis inferioribus I. a se circ.  $1\frac{1}{2}$ –2 cm. remotis, segmentis inferioribus II. 5–6 mm. a se remotis. Sori ad latus superius partis basilaris segmentorum I. vel II. siti breve stipitati, stipitibus apice constrictis; involucrium perfecte bivalvatum oblongo-rotundatum margine denticulatum.

*Hymenophyllum javanicum* HAYATA Ic. Pl. Formos. IV. p. 141, fig. 81, (non SPRENG).

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI; inter Heishana et Niman-daira, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

Differs from *Hymenophyllum javanicum* SPRENG by the much narrower and longer fronds with sori usually situated at the basal portions of the pinnae. Somewhat allied to *H. crispatum* (Hk. et GRIF. t. 77) by the crispate wings of the stipes; but widely different from it by the lanceolate fronds with truncate valves of the involucries. When I found the fern in January 1912, it was of a rather contracted form, attaining not more than 14 cm. in length; but in March 1914, I saw the same fern very much elongate, exceeding twice as long as before, but very much narrower.

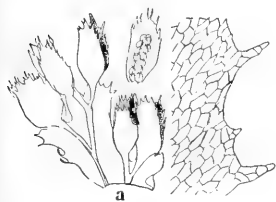
**Hymenophyllum crispato-alatum** HAYATA form. **remotipinnum** Rhizoma repens gracillimum remotissime frondigerum. Stipes 6–10 cm. longus gracillimus a medio sursum alatus sursum cum alis 2 mm. latus. Frons lanceolata 15 cm.–23 cm. longa 3–4 cm. lata apice acuminata basi abrupte truncata apice gradatim acuminatissima bi- vel tripinnatifida, segmentis I. mediis longissimis  $4\frac{1}{2}$  cm. longis 1 cm. latis lineari-lanceolatis a se  $1\frac{1}{2}$  cm. remotis, segmentis II. oblique obovatis vel linearibus 7 mm. longis latere superiore 1–3-lobatis latere inferiore elobatis, lobis linearibus obtusis 1 mm. latis, segmentis II. a se 5 mm. remotis; segmentis I. et segmentis II. a rhachibus angulo 45° agressis; rhachis

frondis et segmentorum alata cum alis 2 mm. lata, alis undulato-crispatis. Sori ad apicem loborum juxta rhachin sitorum solitariter vel geminatim dispositi. Involucrum ovatum dorso complanatum circ. 2 mm. longum  $1\frac{1}{2}$  mm. latum apice truncatum margine subintegrum sed apice crenulato-denticulatum ad basin 2-valvatum. Pagina frondis secus rhachin minute squamulata vel squamis obsoletis.

HAB. Mt. Arisan, inter Heishana et Nimandaira.

**Hymenophyllum Simonsianum** HOOKER (Fig. 92): BAKER Syn. Fil. p. 68. "Stipes slender, wiry, naked, 1-2 in. long; fronds linear-oblong, 2-3 in. long,  $\frac{3}{4}$  in. broad, once pinnatifid down to a broadly-winged rachis: segments fan-shaped, with only shallow divisions directed from the apex towards the base; veins dichotomous, the margins spinuloso-dentate; sori 1 to 4, terminal on the divisions of the upper pinnae: involucrum broadly oblong, divided nearly to the base: valves spinuloso-dentate" the description here quoted agrees exactly with our plant. The figures of the same species given in Hook. 2nd. Cent. Fern. t. 13 and BEDDOME Fern. Brit. Ind. t. 281 accord pretty well with our fern. The following description is drawn from a specimen of my collections: Rhizoma repens filiforme fusco-rubescens teres  $\frac{1}{3}$  mm. in diametro remote paucissime squamatum nitidum; squamæ ad basin stipitum setuliformes fusco-rubescens, minus quam 1 mm. longæ nitidæ. Stipes 1-1 $\frac{1}{2}$  cm. longus glaber vel pilis setuliformibus sparse conspersus castaneo-rubescens teres. Frons in ambitu elongato-oblonga vel oblonga 3 $\frac{1}{2}$  cm.-7 $\frac{1}{2}$  cm. longa 18-23 mm. lata apice rotundata vel obtusissima basi late cuneata vel truncato-cuneata ad basin breviter ad stipitem decurrens pinnatifida inferiore circ. ad costam fissa medio circ. ad locum costa  $\frac{1}{2}$  mm. distantem fissa superiore pinnatilobata, segmentis generaliter cuneatis subunilateralibus mediis 13 mm. longis 11 mm. latis obovato-cuneatis apice obtusissimis basi cuneatis 4 mm. latis latere superiore 2-3-lobatis, lobis oblongis obtusissimis basi haud constrictis, margine toto cum rhachibus argute aristato-serrulatis, serrulis patentibus vel leviter ascendentibus leviter recurvis vel rectis, textura hyalina membranacea in exsiccatō fulvo-viridi utraque pagine glabra sed ad costas venas venulas pilis brevissimis clavatis rubescentibus conspersa, costis venis venulisque utraque pagine convexo-elevatis, venis lateralibus (i.e. costis pinnae vel loborum) a costa rhachis angulo 40° egressis deorsum angu-

lato-recurvis latere superiore venulas 1-2 emittentibus latere inferiore haud venuliferis, venulis sterilibus apice ab apice loborum pinnarum ad locum 1mm. distantem attingentibus sursum evanescentibus, venulis fertilibus apice soro terminatis. Frons versus apicem vel a medio sursum ad apicem loborum vel lobulorum sorifera; sori venas vel venulas terminantes; involucrium dorso valde complana-



tum utraque pagine plus minus convexum 3 mm. longum apice 2 mm. latum obovatum apice truncatum vel obtusum basi  $\frac{1}{2}$  mm. latum, usque ad basin 2-valvatim fissum, valvis dorsalibus ventralibusque conformibus obovatis apicem truncatis vel obtusis margine versus apicem argute dentatis margine lateris integerrimis. Receptaculum clavatum 1 mm. longum rubro-purpureo-coloratum. Spora fulva.

HAB. Mt. Arisan, ad 7000 ped. alt., ad saxum crescens, leg. TAKEO ITÔ



Fig. 92, *Hymenophyllum Simonsianum*  $\times \frac{3}{8}$ ; a, apical portion of a pinna; b, marginal portion of the frond, showing the cellular structure of the same.

et B. HAYATA, Aprili. 1914.

*Trichomanes* SM.

***Trichomanes cupressifolium*** HAYATA Ic. Pl. Formos. IV. p. 136, fig. 73.

This is the most slender fern, hanging vertically on the under side of a large rock, attaining sometimes nearly 50 cm. in length.

***Trichomanes kalamocarpum*** HAYATA sp. nov. Rhizoma repens. Stipes 4-6 cm. longus glaber cum alis medio  $2\frac{1}{2}$  mm. latus. Frons tenuissime membranacea in exsiccatō pallido-fusca haud nitida opaca semi-hyalina glabra in ambitu lanceolata apice acuminata ad summum obtusa basi in ambitu subtruncata vel rotundata 9-14 cm. longa  $2\frac{1}{2}$ -4 $\frac{1}{2}$  cm. lata bipinnatifida, segmentis inferioribus longissimis, infimis paullo brevioribus, superioribus gradatim brevioribus versus apicem ad lobos acuminis reductis, segmentis I. inferioribus  $2\frac{1}{2}$  cm. longis oblique triangularibus  $1\frac{1}{3}$  cm. latis apice triangulari-acutis ad summum obtusis basi latere inferiore fractis pinnatifidis, segmentis II. ovatis vel obovatis lobulatis, lobulis oblongis apice obtusis; rhachis frondis alata medio 2 mm. lata. Sori ad axillas segmentorum I. et II. vel lorum siti lobulos terminantes.

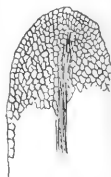


Fig. 93, *Trichomanes kalamocarpum* HAYATA; a portion of a lobe of the frond, showing the cellular structure.

*Trichomanes orientale* HAYATA Ic. Pl. Formos. IV. p. 138, fig. 77, (non C. CH.)

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Distinguishable very clearly from *T. orientale* C. CH. by the cellular structure of the fronds. The cells of the fronds of *T. orientale* are hexagonal bounded by straight lines, while those of the present plant are hexagonal, pentagonal or quadrangular bounded by curved lines. The lobes of this new species are much obtuser than those of *T. orientale*.

***Trichomanes palmifolium*** HAYATA Ic. Pl. Formos. IV. p. 138, fig. 78.

Near *Trichomanes insigne* VAN BOSCH (BEDD. Fern. Brit. Ind. t. 284)

## Polypodiaceæ.\*

*Adiantum* LINN.

**Adiantum hispidulum** Sw? (Fig. 94). Rhizoma repens densissime squamis nigris nitidis obtectum apice cœspitosum frondigerum. Stipes fusco-purpureus subteres ascendens 14-20 cm. longus medio  $\frac{3}{4}$  mm. in diametro primum hispidulus demum glaber nitidus. Frons in ambitu ovata 12 cm. longa totiusque lata pedato-5-ramosa, ramo terminali 10 cm. longo 1 cm. lato lineari apice acuminatissimo, pinnis alternis brevissime petiolulatis flabelliformibus 5 mm. longis 4 mm. latis apice rotundatis basi oblique cuneatis margine denticulatis, partibus cuneatis basalibus integris; petiolulis pinnarum 1 mm. longis; ramis frondis lateralibus alternis a se 1 cm. longis, ramis ad partem ab axillis 5 mm. remotam 1-plo furcatim ramosis, ramulis superioribus 8 cm. longis, ramulis inferioribus  $2\frac{1}{2}$  cm. longis; ramulis linearibus pinnatis, pinnis mediis majoribus inferioribus superioribus gradatim minoribus versus apicem ad nullum reductis; rhachis frondis et ramorum tota hispida fusco-purpurea gracillima; pagina membranacea supra glabra subtus sparse hispida. Sori ad marginem lateris superioris pinnarum siti distincti approximati. Indusia (vel partes pinnarum reflexæ soriferæ) rotundata in exsiccatō rubro-purpurea extus strigoso-hispida intus dense sporangiifera rotundata basi valde constricta.

HAB. Shinsuiye, leg. U. MORI, Dec. 1912.

Near *A. flabellatus* L., but distinguishable from it in having much smaller obliquely cuneate pinnules and by the long creeping rhizomes densely clothed with adpressed black scales.

*Antrophyum* KAULF.

**Antrophyum** sp. (Fig. 95). Rhizoma ?.....dense squamatum. Squamæ rhizomatis fusco-castaneæ lineares 3-8 mm. longæ basi latissimæ  $\frac{1}{3}$ - $\frac{2}{3}$  mm. latæ margine remotissime minuteque setulosæ vel subintegræ. Frons cœspitosa subsessilis oblanceolata cum stipite subnullo 28-35 cm. longa  $2\frac{1}{2}$ -3 cm. lata apice

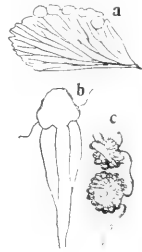


Fig. 94, *Adiantum hispidulum* Sw?; a, a pinna; b, a sorus, indusium turned up; c, sori, seen from above.

\* For convenience sake, the genera under this family are arranged in the alphabetical order.

ab apice frondis usque ad partem ab apice frondis deorsum 3-4 cm. distantem latissima 3 cm. lata apice triangulari-acuta vel acuminata, a parte ab apice frondis 5-7 cm. distante usque ad medium inter apicem et basin gradatim angustata medio deorsum longissime attenuata versus basin linearis, partibus inferioribus linearibus minus quam 4 mm. latis 7-8 cm. longis basi ad basin stipitum attingentibus, margine subplana vel tenuissime recurva subintegra vel versus apicem suberosa; textura in vivo herbaceo-crassiuscula pagine supra atro-viridissima subtus plus minus pallidiora in exsiccatō chartacea haud rigida vel chartaceo-coriacea supra fuscens subtus fulvescens utraque pagine glabra, costa versus basin dorso complanata supra plana haud elevata  $1\frac{1}{2}$  mm. lata subtus tenuiter elevata a basi sursum gradatim indistincta a basi sursum utraque pagine haud distincta haud elevata haud impressa, supra ad soros lineares tenuissime elevata subtus ad soros sulcata: pagina subtus per totam partem superiorem, partibus linearibus inferioribus exceptis, sorifera. Sori lineares a margine 4 mm. ab apice frondis  $1\frac{1}{2}$  cm. distantes subparalleli vel rarius se anastomosantes.

HAB. Mt. Arisan, Nimandaira, leg. TAKEO ITō et B. HAYATA, Mart. 1914.

Very near *Antrophyum Cumingii* FÉE, but easily distinguishable from it by its less furrowed soriferous grooves and by its broader scales on the rhizomes.

### *Asplenium* LINN.

*Asplenium resectum* Sw. var. *obliquissimum* HAYATA n. n. *Asplenium unilaterale* LAM. var. *obliquissimum* HAYATA Ic. Pl. Formos. p. 230.

### *Cheilanthes* Sw.

*Cheilanthes farinosa* KAULE. (Fig. 96). BAKER SYN. Fil. p. 142; HK. et GR. Ic. t. 134; Bot. Mag. t. 4765; BEDD. Fern. South Ind. t. 190. Rhizoma ascendens densissime squamatum apice caespitose frondigerum, squamis fusco-purpurascens lanceolatis 7 mm. longis basi latissimis 1 mm. latis apice subulato-acuminatis basi haud contractis margine subintegris vel remote serrulis minutis instructis medio plus fusco-purpureis margine minus coloratis. Stipes subteres intus haud sulcatus atro- vel fusco-purpurascens nitidus 18 cm. longus  $1\frac{1}{2}$  mm. in diametro basi dense sursum parce squamatus. Frons in ambitu



Fig. 93, *Antrophyum* sp.; a, basal portion of a scale on the rhizome.

elongato-ovata 18 cm. longa 8 cm. lata pinnata, pinna sessilibus oppositis sursum pinnatifidis pinnis infimis longissimis late triangularibus 5 cm. longis  $4\frac{1}{2}$  cm. latis basi latere superiore angustioribus  $1\frac{1}{2}$  cm. latis latere inferiore basi latioribus 3 cm. latis bipinnatifidis deorsum ad rhachin  $1\frac{1}{2}$  mm. latam fidis sursum ad rhachin 2 mm. latam fidis, segmentis infimis (lateris inferioris) linearibus longissimis 3 cm. longis basi latissimis 1 cm. latis apice obtusis ad basin insertionis 3 mm. latis pinnatifidis, segmentis infimis (lateris inferioris) lineari-quadrangularibus 6 mm. longis  $2\frac{1}{2}$  mm. latis apice obtusis margine crenulatis, jugis

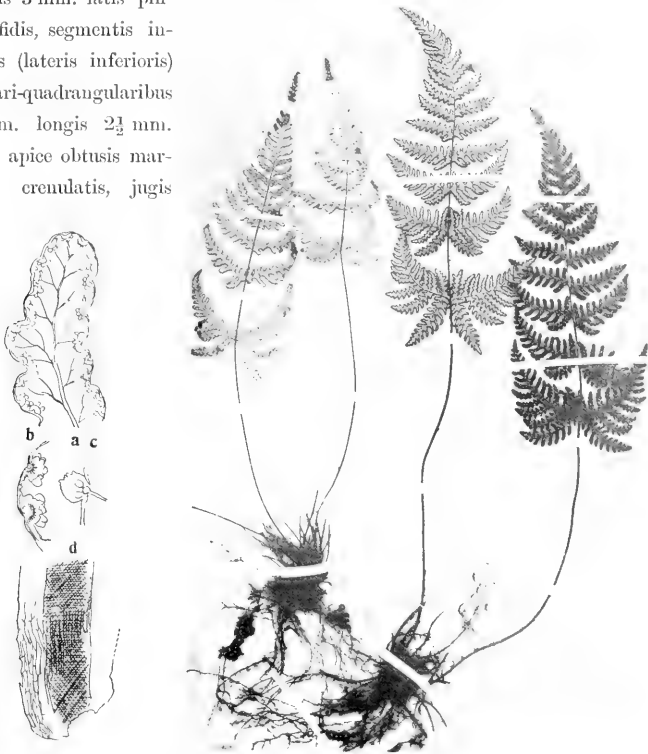


Fig. 96, *Cheilanthes farinosa* KAULF  $\times \frac{1}{2}$ ; a, portion of a pinna, seen from below; b, marginal portion of the same pinna; c, a sorus, indusium turned up, showing the receptaculum; d, basal portion of a scale on the rhizome.

pinnarum inferioribus a se 3 cm. distantibus; textura coriacea, pagina supra viridissima haud nitida subtus pallido-flavo-farinoso; rhachis supra tenuiter canaliculata glabra, costis et venis pinnarum supra manifeste impressis subtus elevatis nigricantibus; pagina frondis subtus dense lepidibus flavis et pilis globuliformibus uni-cellularibus oblecta supra glaberrima haud pilifera sparsissime lepidota. Frons fertilis margine valde recurva, partibus recurvatis  $\frac{2}{3}$  mm. latis tenuissimis membranaceis castaneis lobulato-eroso-denticulatis semi-hyalinis inter soros lobatis. Sori ad apicem venularum liberarum siti rotundati; receptaculum rotundatum a se circ. 1 mm. remotum. Spora rubro-nigra.

HAB. Mt. Arisan: Hasegawakei, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

*Cyclophorus* DESV.

**Cyclophorus Lingua** DESV. var. **angustifrons** HAYATA n. v. Frons angustior quam in typica linearis 10-12 cm. longa 13 mm. lata, caeterum ut in typica.

HAB. Mt. Arisan, ad. 6000 ped. alt., leg. TAKEO ITÔ et B. HAYATA, Mart. 1914.

Differs from the type only by the much narrower fronds.

**Cyclophorus subfissus** HAYATA sp. nov. Rhizoma repens teres  $1\frac{1}{2}$  mm. in diametro squamis dense oblectum fuscens, pulvinis sub stipite  $2\frac{1}{2}$  mm. longis dense squamatis. Stipes 2 cm. longus dorso complanatus supra planus subtus convexus medio  $1\frac{1}{2}$  mm. latus dense floccoso-tomentosus demum glabratus, pilis fulvescentibus stellatis. Frons lineari-lanceolata apice acuminatissima circ. 20 cm. longa 13 mm. lata basi infra medium subito angustior subito attenuata ad stipitem abeuns, partibus attenuatis minus quam 3 mm. latis 4 cm. longis, costa supra tenuiter elevata supra complanata; pagina primum tomentosa demum glabrata subtus densissime fulvo-stellato-tomentosa dense sorifera. Sori rotundati rubescentes  $\frac{1}{2}$  mm. in diametro. Textura valde coriacea, pagina in exsiccatu viridis supra minute impresso-punctata.

HAB. Mt. Arisan: Hasegawakei, leg. TAKEO ITÔ, Aprili. 1914.

Near *Niphobolus fissus* BLUME, but differs from it by the much longer stipes; also near *N. transmorrisonensis* HAYATA, but distinguishable from it by the not fringed scales. Also very near *C. flocciger* BLUME; (BAKER Syn. Fil. p. 351; COPEL. PHILIPP. Journ. Sci. p. 113;) Very probably identical with it.

**Cyclophorus taiwanensis** C. CH. Ind. Fil. p. 201.

*Polypodium taiwanensis* CHRIST, in WARB. Monsunia I. p. 60, (1901).



*Davallia* Sm.

***Davallia chrysanthemifolia*** HAYATA sp. nov. (Fig. 97). Rhizoma repens gracile teres 1 mm. in diametro dense adpressequ squamatum, squamis imbricatis castaneis lineari-lanceolatis 7–10 mm. longis 1 mm. latis apice obtusis basi obtusis peltatis ab insertione usque ad extremitatem 1 mm. longis margine erosis vel integris fulvo-castaneis margine fulvis apice  $\pm$  fimbriatis vel vix fimbriatis ad rhizoma adpressis, rectum remote frondigerum, frondibus a se 10–15 mm. remotis. Stipes 3–4 cm. longus teres densiuscule squamatus, (squamis minoribus oblongis peltatis margine eroso-fimbriatis vel vix fimbriatis), supra profunde sulcatus medio minus 1 mm. latus. Frons triangulari-ovata vel pentagona 5–6 cm. longa 4 cm. lata apice acuminata basi in ambitu leviter cordata pinnata; pinnis vel lobis soriferis frondis fertilis quam iis frondis sterilis angustioribus; pinnis infimis longissimis 3 cm. longis triangulari-oblongo-ovatis  $1\frac{1}{2}$  cm. latis apice acuminatis ad summum obtusis basi triangulari-acutis, pinnis superioribus gradatim angustioribus linearibus brevioribus versus apicem ad dentem acuminis abeuntibus; pinnis mediis lineari-triangularibus 18 mm. longis 6–7 mm. latis apice gradatim angustioribus ad summum obtusis vel truncatis basi cuneatis breve petiolatis (petiolis 1 mm. longis) basi pinnatifidis basi sursum pinnatilobis, segmentis inferioribus cuneiformibus apice acutis basi cuneatis, segmentis vel lobis sursum brevioribus versum apicem ad dentem abeuntibus. Rhachis frondis subalata medio costata, costa supra elevata, costulis pinnarum supra elevatis subtus tenuissime elevatis vel haud elevatis subplanis, venis venulis supra impressis subtus haud elevatis subplanis. Textura valde coriacea, pagina supra glabra subtus ad costas rhachis venas venulasque minute squamata; pinnis mediis rhachis frondis angulo  $45^\circ$  egressis; segmentis vel lobis a costa pinnarum angulo  $40^\circ$ – $30^\circ$  egressis; pinnis inferioribus se 8 mm. remotis.

HAB. Mt. Arisan, inter Mingetzu et Senninbora, leg. TAKEO ITÔ, Aprili. 1914, (No. 27).



Fig. 97, *Davallia chrysanthemifolia* HAYATA; a, basal portion of a scale on the stipe; b, portion of a frond; c, a sorus much more magnified.

Very near *Davallia pedata* Sm., but differs from it by the much broader involucrem.

*Dennstædtia* BERNH.

*Dennstædtia leptophylla* HAYATA sp. nov. (Fig. 98). Rhizoma? Stipes plus 60 cm. longus brevissime hirsutus in exsiccato fulvo-castaneus. Frons basi tripinnata in ambitu ovata apice acuminata basi in ambitu obtusa 120 cm. longa 100 cm. lata, pinnis alternis inferioribus a se 17 cm. remotis a rhachide frondis angulo  $45^{\circ}$  egressis, pinnis inferioribus longissimis, infimis paullo brevioribus, pinnis inferioribus circ. 70 cm. longis oblongo-lanceolatis apice caudato-acuminatissimis basi truncatis breve petiolatis, pinnulis ordinis I. inferioribus mediisque æquilongis lineari-lanceolatis, superioribus minoribus versus apicem ad lobos acuminis reductis, mediis circ. 10 cm. longis medio 2 cm. latis apice caudato-acuminatis basi latissimis basi latere superiore subauriculato-lobatis, pinnulis ord. II. oblongo-quadrangularibus, mediis 1 cm. longis 4 mm. latis apice obtusis basi cuneatis latere superiore subauriculatis margine lobatis, (lobis oblongis rotundatis apice obtusissimis sursum minute serrulatis); textura tenuissima membranacea herbacea in exsiccato pallido-viridis pagina supra minus subtus plus hirsuta; rhachis frondis, pinnarumque in sectione plano-convexa supra plana medio sulcata latere (utroque) 1-sulcata subtus convexa rubescens hirsuta; rhachis pinnularum complanata anguste alata; pinnulis inferioribus ord. I. subalternis a se 2 cm. remotis a rhachide pinnarum angulo  $80^{\circ}$ - $90^{\circ}$  egressis vel interdum deorsum reflexis tenuissimis, pinnulis ord. II. subalternis a se 5-6 mm. remotis a rhachide pinnularum angulo  $80^{\circ}$  egressis, pinnis pinnulis I. vel pinnulis II. plus minus petiolatis vel sessilibus. Sori in sinu loborum pinnarum ord. II. siti.

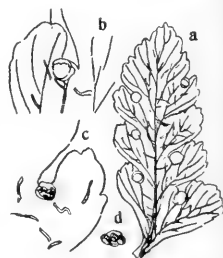


Fig. 98, *Dennstædtia leptophylla* HAYATA; a, a pinnule; b, portion of the same, showing the position of a sorus; c another sorus; d, another sorus.

HAB. Urai, Juli. 1912, leg. B. HAYATA et S. SASAKI.

Near *Dennstædtia cuneata* (J. Sm. et Hk.) CHRIST, but distinguishable from it by the very much hirsute fronds. Also near *D. Smithii* Moore, but

differs from it by the very thin herbaceous fronds with very much smaller sori.

**Dennstædtia scabra** MOORE (Fig. 99). MATSUM. et HAYATA Enum. Pl. Formos. p. 594. Rhizoma repens vermiforme recurvum rubescens versus apicem dense pilosum haud squamatum, pilis rubescentibus vel albescentibus filiformibus 2 mm. longis adpressis vel ascendentibus 3 mm. in diametro remote frondigerum, frondibus a se 3 cm. distantibus remote radicanibus, radicibus filiformibus ramosis. Stipes 16-35 cm. longus medio 3 mm. crassus castaneo-rubescens muricatus basi squamato-pilosus sursum scaber nitidus subglaber supra profunde sulcatus subteres subtus convexus. Frons tripinnata in ambitu triangulari-ovata 12-40 cm. longa 11-40 cm. lata apice triangulari-acuminata basi in ambitu triangulari-obtusa, pinnis infimis longissimis superioribus gradatim minoribus versus apicem subito minoribus ad dentem ascendentem

acutis, pinnis infimis in specimine maximo nostro acuminato-triangularibus 24 cm. longis 11 cm. latis apice acuminatissimis basi triangulari-obtusis latere inferiore



Fig. 99, *Dennstædtia scabra* MOORE  $\times \frac{1}{6}$ ; a, portion of a pinnule; b, a sorus; c, hairs on the frond.

basi duplo latioribus quam latere superiore pinnatis; pinnulis ordinis I. infimis latere inferiore longissimis 10 cm. longis lanceolatis 2 cm. latis apice acuminatis basi late triangulari-acutis, superioribus gradatim minoribus versus apicem pinnarum ad dentem ascendentem acuminis relictis subæqualiteralibus pinnatis, pinnulis ordinis II. infimis elongato-triangulari-oratis  $1\frac{1}{2}$  cm. longis 5 mm. latis apice triangulari-obtusis basi late cuneatis inæqualibus latere superiore latioribus quam latere inferiore basi 2 mm. latis basibus 2 mm. latis cum rhachibus connatis pinnatilobis, lobis utroque latere 3-4 oblongis obtusis; pinnis et pinnulis ordinis I. inferioribus breve petiolulatis, pinnulis II. sessilibus; pinnulis ordinis I. infimis latere inferiore pinnarum infimarum ab axillis 2 cm. distantibus, iis latere superiore ab axillis 6 mm. distantibus. Rhachis frondis castaneo-rubescens subtetragona supra sulcata et pilosa subtus subglabrata plus minus scabra medio plus quam 1 mm. crassa tenuiter flexuosa; rhachis pinnarum gracilis subflexuosa supra sulcata et pilosa subtus subglabrata stramineo-pallida; costa venaque pinnularum I. supra vix subtus prominente elevata; textura herbacea membranacea, pagina in vivo pallido-viridis in exsiccato fulvo-viridis supra plus minus minute squamata subtus pallidior plus minus pilis et squamis minutis conspersa; pinnis a rhachide frondis angulo  $50^\circ$  egressis; pinnulis I. a rhachide pinnarum angulo  $80^\circ$  egressis; pinnis inferioribus alternis utroque latere 5-6 cm. remotis; pinnulis I. inferioribus alternis utroque latere a se 2 cm. remotis; pagina frondis supra plus minus hirsuta subtus ad costam venas hirsuta. Sori ad apicem lobulorum loborum pinnularum terminales plus minus deorsum et interiore recurvi vel haud recurvi, venulas lobulorum terminantes. Involucrum late quadrangulare  $\frac{3}{4}$  mm. longum  $\frac{3}{4}$  mm. latum apice perfecte truncatum vel rotundatum plus minus dorso complanatum supra minus subtus valde plus convexum ad orem truncatum haud lobatum ad marginem oris obscure crenatum; receptaculum subglobosum vix productum.

HAB. Mt. Arisan, leg. TAKEO ITÔ et B. HAYATA, Mart. 1914.

*Diplazium* Sw.

**Diplazium Hancockii** (MAX.) HAYATA n. n. (Fig. 100). *Asplenium Hancockii* MAXIM.; MATSUM. et HAYATA Enum. Pl. Formos. p. 603. Rhizoma ascendens apice frondes cæspitosum gerens. Stipes 9 cm. longus basi incrassatus, partibus incrassatis nigricantibus nitidis, sursum flavescentes subteres hirsutus

supra canaliculatus subtus convexus squamatus et hirsutus sursum 1 mm. in diametro, squamis triangularibus fuscentibus cuspidato-acuminatis minus quam 1 mm. longis  $\frac{1}{2}$  mm. latis haud cordatis haud peltatis. Frons oblongo-lanceolata 27 cm. longa medio inferiore latissima 7 cm. lata apice caudato-acuminata basi in ambitu obtusa pinnata sed versus apicem gradatim pinnatifida vel pinnatiloba gradatim ad acumen crenatum lineare minus quam 1 cm. latum  $5\frac{1}{2}$  cm. longum abeuns, pinnis a medio inferioribus longissimis, infimis brevioribus dimidium earum mediarum in longitudine æquantibus 2 cm. longis 8 mm. latis valde deorsum reflexis oblongo-linearibus sessilibus apice obtusissimis basi latere inferiore obtusis latere superiore auriculatis margine subintegris, pinnis mediis longioribus 4 cm. longis 8 mm. latis oblongo-linearibus medio basique æquilatis apice acuminatis sessilibus vel ad rhachin adnatis ad basin ad 5 mm. contractis margine sursum ascendento-crenulatis deorsum subintegris basi latere inferiore obtusis basi latere superiore auriculatis, auriculis subtri-

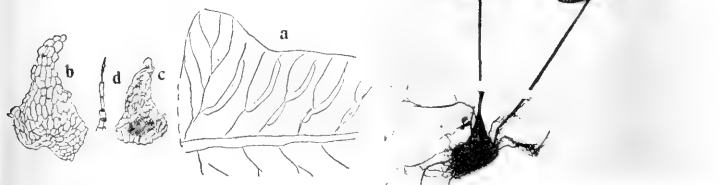


Fig. 100, *Diplazium Hancockii* (MAXIM.) HAYATA  $\times \frac{7}{10}$ ; a, portion of a pinna; b, a scale on the apex of the rhizome; c, another one; d, a hair on the frond.

angularibus apice acutis latere interiore cum rhachibus parallelis basi latere superiore cum auricula 5 mm. latis basi latere inferiore 3 mm. latis sursum falcato-recurvis; textura membranacea, pagina supra sparsissime subtus ad costas dense crispato-hirsuta ad marginem tenuissime remotissime ciliolata supra in exsiccatō fuscens subtus fulvescens: pinnis vel segmentis vel lobis superioribus gradatim minoribus obtusioribus versus apicem ad crenam acuminis abeuntibus. Rhachis frondis densissime crispato-hirsuta supra plana tenuissime canaliculata superiore ad costam abeuns, costa elevata supra plana sulcata subtus convexo-elevata, costis et venis pinnarum supra sparsissime hirsutis fusco-coloratis laud elevatis subtus leviter elevatis, venis lateralibus simplicibus vel furcatis liberis prope marginem attingentibus tenuissimis apice laud clavatis rectis a costa angulo circ. 45° egressis. Pinna media a rhachide frondis angulo 90° egressis sursum falcata, pinnis inferioribus gradatim descendentibus infimis valde deorsum reflexis a rhachide angulo 140° egressis, superioribus plus minus ascendentibus a costa angulo 80° egressis; pinnis inferioribus oppositis, jugis a se 13 mm. remotis, a mediis superioribus alternis gradatim approximatis fere se ad marginem contractis. Stipes cum fronde toto pilis articulatis dense vel sparse conspersus, pilis 4-5-cellularibus articulatis laud coloratis. Indusium lineare 5 mm. longum  $\frac{1}{2}$  mm. latum ad marginem liberum erosum extus hirsutum. Sporangium secus venas 1-seriatim dispositum majusculum oblongum  $\frac{1}{3}$  mm. longum subsessile.

HAB. inter Rahao et Tonroku, leg. TAKEO ITÔ et S. FUJII, Nov. 1914.

This is one of the rare examples of *Diplazium*-species having articulated hairs.

***Diplazium inflatisorum* HAYATA** sp. nov. (Fig. 101). Rhizoma. .... Stipes 120 cm. longus quam frondibus longior latere compressus subteres medio 1 cm. longus basibus exceptis laud squamatus pilis minutis nigricantibus conspersus demum glaber muricato-scabriusculus laud nitidus opacus fusco-rubescens supra planus subtus convexus latere valde compressus supra versus medium profunde sulcatus sub lente minute muricato-punctatus. Frons in ambitu triangulari-ovata 100 cm. longa totiusque lata apice triangulari-acuta ad summum acuminata basi in ambitu truncato-acuta bipinnata, pinnis suboppositis infimis longissimis superioribus gradatim brevioribus versus apicem

ad lobos acuminis abeuntibus, pinnis infimis elongato-triangulari-oblongis cum petiolulis 60 cm. longis 25 cm. latis a medio deorsum aequalatis apice gradatim acuminatis ad summum acuminatis pinnatis, pinnulis inferioribus lineari-lanceolatis 14 cm. longis 4 cm. latis a medio deorsum aequalatis apice caudato-acuminatis basi perfecte truncatis latere inferiore latioribus quam latere superiore brevissime petiolulatis (petiolulis 3 mm. longis) deorsum pinnatifidis medio pinnatilobis sursum gradatim denticulatis, segmentis inferioribus lineari-quadrangularibus 22 mm. longis 10 mm. latis apice rotundatis vel truncatis margine remote et tenuissime serrulatis vel subintegris 2 mm. a se remotis vel totiusque latis, sinibus inter lobos vel segmentos acuminatis angustissimis medio 1-1½ mm. latis; pinnis suboppositis a rhachide frondis angulo 45° egressis, pinnulis a rhachide pinnarum angulo 80° egressis, segmentis vel lobis pinnularum a rhachide pinnularum angulo 80° vel 90° egressis; pinnis inferioribus petiolatis (petiolis 5-3 cm. longis), a se 20 cm. remotis, pinnulis inferioribus pinnarum inferiorum a se 3-5 cm. remotis; pagina herbacea membranacea supra glabra subtus ad costas et venas squamis minutis et pilis minutis sparsissime dispersa; costa supra complanato-elevata utroque latere minute pilosa interrupte alata, alis erectis ½ mm. latis; venis venulis supra tenuiter elevatis, venis venulis supra basi furcato-ramosis, ramis venularum subrectis parallelis ad apicem marginem attingentibus apice elevatis; costis venis venulis subtus tenuiter elevatis, venulis totis liberis haud anastomosantibus. Frons ad totam paginam sorifera. Sori prope vel versus costas costulas et venulas utroque latere 1-seriatim siti ab apice ab margineque lorum 3-5 mm. distantes oblongo-lineares 3-4 mm. longi ½ mm. lati. Indusium inflatum lineari-oblongum sacciforme complete soros involvens.

HAB. Mt. Arisan: inter Funkiko et Taroyen.

Very near *D. costalisorum* HAYATA, but distinguishable from it in having nearly entire segments or lobes, which have sori locating in a single series on each side of the costules. In *D. costalisorum*, the soriferous lobes are usually dentate or lobulate.

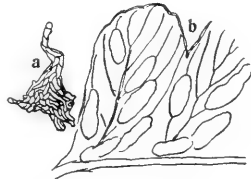


Fig. 101, *Diplazium inflatisorum* HAYATA; a, a scale on the frond; b, a portion of a pinna.

**Diplazium iridiphyllum** HAYATA n. n. *Asplenium iridiphyllum* HAYATA  
Ic. Pl. Formos. IV p. 223.

**Diplazium Makinoi** YABE var. **karapinense** HAYATA sp. nov. (Fig. 102).  
Rhizoma ascendens dense nigro-squamatum. Stipes 27 cm. longus medio  $1\frac{1}{2}$ –2 mm. latus cinerascens basi deorsum nigrisquamatus basi sursum subglabratus supra late canaliculatus, squamis linearilanceolatis 1 cm. longis vel longioribus minus quam 2 mm. latis apice longissime acuminatis subulatis basi profunde cordatis, lobis cordis a se imbricatis, margine ciliolato-serrulatis, serrulis deorsum recurvis fuscentibus. Frons ovata 25–30 cm. longa 14–18 cm. lata pinnata in ambitu acuminata basi in ambitu obtriangulari-acuta, pinnis lateralibus utroque latere 3–4, infimis longissimis superioribus gradatim brevioribus, superrimis minimis quam pinna terminali minoribus; pinna terminali cum pinnis infimis æquilata equilonga vel paullo minora; pinnis infimis longissimis lanceolatis vel oblanceolatis 13–15 cm. longis 20–23 mm. latis apice caudato-acuminatis ad summum acutis vel obtusis basi subito acutis vel late cuneatis,

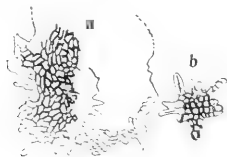



Fig. 102, *Diplazium Makinoi* YABE var. *karapinense* HAYATA  $\times \frac{1}{4}$ ; a, a scale on the rhizome; b, a scale on the frond.



(petiolulis 8-5 mm. longis) margine subintegris vel eroso-denticulatis -formiter recurvis vel rectis, pinnis cæteris conformibus sed in magnitudine variabilis; petiolulo terminali 1-1½ cm. longo, petiolulis lateralibus longioribus: textura chartacea herbacea, in exsiccato pagina supra viridis subtus pallidissima supra glabra subtus subglabrata squamis minutis dispersa: rhachis frondis dorso complanata supra plana late sulcata 1½ mm. lata subviridis subtus convexa subglabra; costa pinnarum dorso complanata supra minus subtus plus elevata supra medio tenuiter canaliculata vel haud canaliculata, venis lateralibus numerosissimis utraque pagine elevatis a basi furcatim 2-ramosis, ramis parallelis: costis pinnarum a rhachide frondis angulo 45° egressis, venis lateralibus a costa pinnarum angulo 30-40° egressis; pagina frondis supra glabra subtus sparsissime squamata, (squamis amœboideis multipedatis minutis ¼ mm. in diametro), per totam paginam sorifera. Sori utroque latere costæ prope costam secus venas 1-seriatim siti lineares 13 mm. longi a costa 1 mm. a margine pinnarum 3-4 mm. distantes. Indusium integrum.

HAB. Mt. Arisan, inter Karapin et Funkikō, Mart. 1914, leg. TAKEO ITō et B. HAYATA.

Very near *Diplazium Makinoi* YABE, but differs from it by the shallowly serrate margin and more loosely arranged sori.

***Diplazium odoratissimum* HAYATA sp. nov.** (Fig. 103). Rhizoma in vivo subviride ascendens subsucculentum apice frondes 2-3 emittens. Stipes 35 cm. longus basi 7 mm. crassus dorso complanatus in sectione lentiformis sursum 2-3 mm. latus basi squamatus sursum glabratus supra late canaliculatus, canaliculis sursum 2 mm. latis, stramineus. Squamæ basis stipitum vel rhizomatis castaneæ lineari-lanceolatæ apice filiforme acuminate basi truncatæ 1-1½ cm. longæ 1-2 mm. latæ. Frons in ambitu elongato-oblonga 40 cm. longa 17 cm. lata apice late cuspidata basi in ambitu obtusa inferiore pinnata a medio superiore pinatifida, pinnis inferioribus suboppositis, jugis a se 8 cm. remotis, pinnis infimis sessilibus oblongo-lanceolatis 10 cm. longis 3 cm. latis apice caudato-acuminatis plus minus obliquis latere superiore subrectis latere inferiore recurvis, costis pinnarum falcatis sursum recurvis, pinnis basi rotundatis plus minus obliquis margine subintegris vel obscure eroso-undulatis, pinnis juxta pinna infimas inferioribus quam pinna infima paullo longioribus ea conformibus; segmentis

infimis partum frondis pinnatifidarum longissimis quam pinna cætera longioribus 13 cm. longis plus quam 3 cm. latis lineari-lanceolatis apice caudato-acuminatissimis basi 3 cm. latis ad rhachin adnatis subalternatis, segmentis superioribus gradatim minoribus basi latere inferiore ad rhachin 13 mm. latam decurrentibus; rhachis partium frondis pinnatifidarum sursum 22 mm. lata, segmentis lateralibus superioribus brevioribus, segmentis juxta segmentum terminale lineari-oblongis 6 cm. longis  $2\frac{1}{2}$  cm. latis ad segmentum terminale haud abeuntibus; segmento terminali elongato-oblongo-triangulari 10 cm. longo basi  $5\frac{1}{2}$  cm. lato apice gradatim acuminato basi obtriangulari, ad basin 2 cm. lato deorsum utroque latere 2-3 lobato, lobis triangularibus apice acutis haud ascendentibus, sursum haud lobato margine eroso; sinibus inter segmenta in forme variabilibus; textura herbacea membranacea, pagina in vivo supra atro-viridissima subtus pallidior supra subglabra subtus parcissime squamis minutis dispersa haud squamata. Rhachis frondis supra canaliculata subtus convexa in sectione dorso complanata lunuliformis piloso-squamata; pinnis segmentis totis plus minus falcato-ascendentibus, costis mediis a rhachide frondis angulo circ.  $70^\circ$  egressis, venis lateralibus et venulis totis anastomosantibus. Indusium margine erosum. Sori vermiformilineares prope costas versus venas extensi, a margine 10-5 mm. distantes.

HAB. Mt. Arisan: inter Funkiko et Taroyen, leg. TAKEO ITÔ, Mart. 1914.

Very near *Diplazium heterophlebium* DIELS (= *Asplenium heterophlebium* METT. BAKER Syn. Fil. p. 243 = *Anisogonium heterophlebium* BEDD. Fern. Brit. Ind. t. 329), but distinguishable from it by the pinnæ which are subentire at the margin,

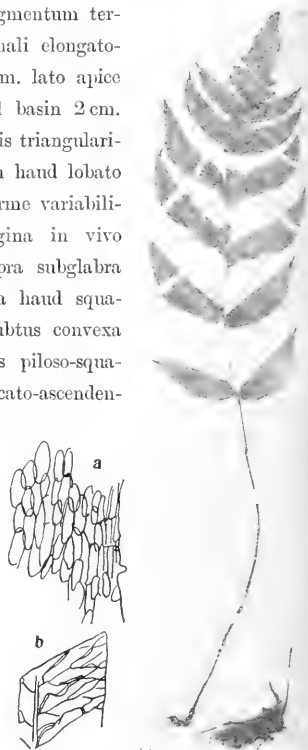


Fig. 103, *Diplazium odoratissimum* HAYATA  $\times \frac{1}{10}$ ; a, a portion of a scale on the rhizome; b, a portion of the frond.

but not cordate at the base.

*Dryopteris* ADANS.

***Dryopteris erubescens*** (WALL.) C. CHR. (Fig. 104) Ind. p. 263. *Polypodium erubescens* WALL. Hk. Sp. Fil. IV. p. 236; HOOK. et BAKER Syn. Fil. p. 306. Rhizoma ignotum. Stipes (exceptis partibus basilaribus ignotis) circ. 100 cm. longus medio  $1\frac{1}{2}$  cm. latus plus minus squamis tenuissimis caducissimis obtectus subglabratus nitidus supra leviter canaliculatus subtus convexus stramineus nitidus. Frons ovato-lanceolata 120 cm. longa quam stipite longior pinnata apice in ambitu subito caudato-acuminata basi in ambitu obtusa pinnata, pinnis basi sessilibus subtus glandulis impressis singulis instructis, mediis inferioribus subæquilongis longissimis 25 cm. longis superioribus gradatim minoribus brevioribus sed versus apicem subito abrupte brevioribus ad segmentum pinnæ terminalis subito abrupte abeuntibus, pinnis inferioribus acuminatissimo-linearibus 25 cm. longis medio  $2\frac{1}{2}$  cm. latis ad basin subito latissimis  $5\frac{1}{2}$  cm. latis apice longissime acuminatis latere inferiore quam latere superiore latioribus sessilibus deorsum pinnati-sectis medio pinnatifidis sursum pinnati-lobis, segmentis inferioribus gradatim longioribus, segmentis infimis abrupte longissimis superioribus gradatim minoribus versus apicem ad dentam acuminis reductis, infimis cum medio  $\frac{2}{3}$ -plo superantibus linearibus  $3\frac{1}{2}$  cm. longis 6 mm. latis

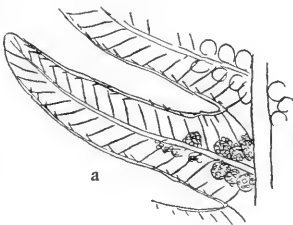


Fig. 104, *Dryopteris erubescens*  $\times \frac{2}{17}$ ; a, a portion of a pinna.

apice obtusis basi plus minus dilatatis ad costam pinnarum adnatis margine angustissime cartilagineo-marginatis ciliolis aristiformibus instructis in exsiccatō margine deorsum recurvis; pinna terminalis 13 cm. longa caudiforme producta  $2\frac{1}{2}$  cm. lata cum pinnis lateralibus mediis subconformis sed brevior et latior; segmentis lateralibus pinnarum haud approximatis, sinibus inter segmenta cum segmentis ipse subæquilatis vel minus latis; pinnis inferioribus a rhachibus frondium deorsum sursum falcato-divaricatis, inferioribus deorsum vald  $\smile$ -formiter sursum  $\frown$ -formiter recurvis, superioribus subrectis; segmentis pinnarum deorsum subrectis sursum  $\smile$ -formiter recurvis; pinnis suboppositis, jugis inferioribus a se  $3\frac{1}{2}$  cm.-4 cm. remotis. Rhachis frondis medio 4 mm. lata glabra subnitida in exsiccatō straminea supra late canaliculata dorso complanato-tereto-subtetragona utroque latere tenuiter sulcata dorso subplana vel leviter convexa, costa pinnarum supra distincte elevata subtus prominente elevata supra plana tenuiter sulcata hirsuta fuscens subtus glabra convexa straminea; costis venis segmentorum pinnarum supra impressis subtus elevatis, venis simplicibus rarius furcatis rectis ad marginem attingentibus a costa angulo  $50^\circ$  egressis sub luce transversa distincte visis; pagina utraque glabra ad marginem aristato-ciliolata supra in vivo et exsiccatō viridissima subtus paullo pallida; textura chartacea vel tenuiter coriacea. Frons subtus a basi per totam longitudinem (partibus superioribus frondis pinnarum segmentorum exceptis) sorifera. Sori utroque latere costæ segmentorum approximatin 1-seriatim firme prope costam siti a margine valde distantes globosi haud involucrati. Indusium nullum. Pili frondis unicellulares.

HAB. Mt. Arisan: Jujiro ad 6000 ped. alt., leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

BAKER's description is as follows:—"Stipes 2 ft. or more long; tetragonous, glossy, stramineous, naked; fronds 3-4 ft. long, 1-2 ft. broad; lower pinnae sometimes 1 ft. long,  $1\frac{1}{2}$  in. broad, cut down nearly to the rhachis into close acute or bluntish entire lobes 2 lin. broad; texture rigid, subcoriaceous; rhachis on both sides naked; veinlets simple, often 20 on a side; the sori close to the raised midrib." The description here quoted agrees very well with our plant, except the ciliolate margins which however are mentioned in BEED. Fern. Brit. Ind. t. 213.

***Dryopteris hirsutisquama*** HAYATA sp. nov. (Fig. 105). Rhizoma ascendens apice cæspitosum frondigerum. Stipes 30–40 cm. longus frondem in longitudine superans basi dense squamatus supra basin sursum fere glaber vel vix squamatus teres supra profunde bisulcatus subtus convexus pallido-stramineus plus minus viridescens subnitidus gracillimus medio  $\frac{2}{3}$  mm. latus. Frons ovato-lanceolata vel ovato-oblonga 30 cm. longa 13 cm. lata apice acuminatissima ad summum acuminis obtusa basi in ambitu obtuso-rotundata pinnata versus apicem pinnatifida vel pinnatifida ad acumen apicis frondis integra, partibus integris acuminis linearibus 18 mm. longis minus 2 mm. latis apice obtusis, pinnis subrectis vel sursum falcatis ascendente recurvis, pinnis inferioribus longissimis, infimis brevioribus 7 cm. longis acuminatis, superioribus obtusis vel obtusissimis gradatim brevioribus ad lobos acuminis abeuntibus, pinnis juxta eam infimam longissi-



Fig. 105, *Dryopteris hirsutisquama* HAYATA  $\times \frac{2}{3}$ ; a, a sorus; b, portion of a pinna.

mis 8 cm. longis lineari-lanceolatis apice acuminatis 13 mm. latis ad medium latissimis ad basin minus latis vel æquilatis vel latioribus medio sursum gradatim angustioribus ad acumen abeuntibus deorsum ad prope rhachin pinnatifidis medio pinnatilobis versus apicem dentatis ad acumen integris, segmentis infimis lineari-oblongis 8 mm. longis 3-4 mm. latis apice truncato-rotundatis basi plus minus dilatatis margine integris vel obtuso-serrulatis; textura herbacea tenuissima membranacea, pagina in exsiccatō viridescens supra minus subtus plus hirsuta; costa pinnarum supra subimpressa hirsuta subtus elevata impressa, costa segmentorum mediorum subrecta subtus vix elevata, venis loborum utroque latere costæ 4-6 rectis apice clavatis prope marginem evanescentibus soro terminatis; pinnis alternis vel suboppositis inferioribus a se 3-4 cm. longis, superioribus gradatim se approximatis, sinibus inter segmenta pinnarum inferiorum quam segmento angustioribus; pinnis inferioribus a rhachide frondis angulo recto vel obtusissimo egressis, segmentis pinnarum inferioribus a rhachide pinnarum angulo recto vel obtusissimo egressis; rhachis frondis dorso complanata medio  $\frac{3}{8}$  mm. lata supra minus subtus plus hirsuta laud canaliculata. Frons per totam paginam sorifera. Sori utroque latere costæ segmentorum 1-seriatim siti. Indusium rotundatum margine crenulatum extus hirsutum.

HAB. Inter Tonroku et Remogan, leg. TAKEO ITÔ et FUJII, Nov. 1914.

**Dryopteris kwasho-**  
**tensis** HAYATA sp. nov. (Fig. 106). Rhizoma ignotum. Stipes 40 cm. longus medio 6 mm. latus basi leviter squamatus fuscens medio sursum stramineus subtereto-subtetragonus supra sulcatus, medio

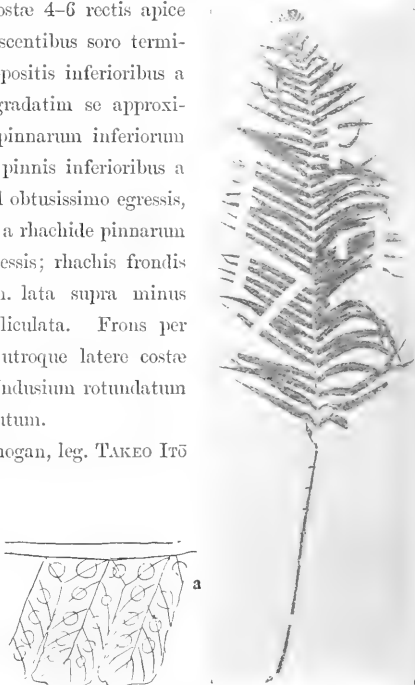


Fig. 106, *Dryopteris kwashotensis* HAYATA  $\times \frac{3}{8}$   
a, a portion of a pinna.

sursum pinnis rectis auriculiformibus utroque latere 5 instructus, pinnis auriculiformibus oppositis, (jugis a se 4cm. remotis), in ambitu ovatis apice acutis basi cuneatis 8 mm. longis 4 mm. latis margine serrulatis. Frons elongato-oblongo-ovata 70cm. longa 30cm. lata apice acuminata basi abrupte subtruncata pinnata, pinnis inferioribus linearibus 18 cm. longis  $1\frac{1}{2}$  cm. latis apice acuminatissimis basi sessilibus versus basin plus minus angustioribus margine regulariter lobulatis, lobulis  $2\frac{1}{2}$  mm. longis  $3\frac{1}{2}$  mm. latis quadrangularibus apice perfecte truncatis margine latere integris apice parte truncata erosis; textura tenuiter chartacea, pagina utraque glabra. Rhachis frondis glabra subtereto-tetragona supra canaliculata utroque latere tenuiter sulcata subglabra; costa pinnarum supra distincte complanateque elevata sulcata subglabra subtus prominente elevata straminea, costulis et venisque utraque pagine distincte elevatis; pinna a rhachibus frondis angulo  $50^\circ$  egressis deorsum rectis sursum  $\sim$ formiter recurvis, lobulis pinnarum se approximatis. Pagina subtus tota sorifera. Glandulæ lunulares ad rhachin ad axillas pinnarum latere inferiore singulariter sitæ in exsiccatō fusco-coloratæ. Indusium cordato-rotundatum latius quam longius supra hirsutum. Pili unicellulares.

HAB. Kwashōtō: leg. G. NAKAHARA, Feb. 1906, (No. 967).

### **Dryopteris**

#### **kotœnsis** HAYATA

sp. nov. Rhizoma

ignotum.

Stipes 70cm. longus

basi deorsum

squamatus sursum

subglaber

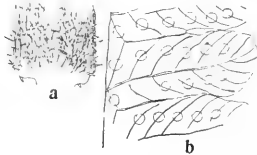


Fig. 107, *Dryopteris kotœnsis* HAYATA  $\times \frac{1}{10}$ ; a, basal portion of a scale on the stipe; b, a portion of a pinna.

cicatricibus squamarum laxiusecule notatus, cicatrisibus  $\Omega$ -formibus, sursum densissime glandulis punctiformibus fulvescentibus obteetus medio sursum pinnis brevissimis auriculiformibus oppositis instructus, pinnis auriculiformibus oppositis, jugis a se 5 cm. remotis, superrimis elongato-oblongis 27 mm. longis 14 mm. latis apice obtusissimis basi late triangulari-acutis margine lobulatis, lobulis obtusissimis, infimis brevissimis 1 cm. longis  $1\frac{1}{2}$  cm. latis apice obtusissimis basi utroque latere auriculiforme productis. Squamæ basis stipitum lanceolato-lineares 1-2 cm. longæ 1-2 mm. latæ apice longissime acuminatæ basi haud cordatæ subtruncatæ fusco-castaneæ extus margine hirsutæ intus glabræ. Frons triangulari-ovata 75 cm. longa 40 cm. lata in ambitu triangulari-acuta basi in ambitu truncato-cordata pinnata, pinnis inferioribus æquilongis longioribus 26 cm. longis medio sursum superioribus gradatim brevioribus versus apicem subito brevioribus ad pinnam superrimam lateralem 7 cm. longam abeuntibus et abrupte pinnam terminalem abeuntibus; pinna terminali pinnam lateralem superrimam in longitudine duplo superanti triangulari-lineari 14 cm. longa basi 3 cm. lata apice acuminatissima deorsum pinnati-fida, segmentis infimis longissimis lineari-lanceolatis acuminatis  $4\frac{1}{2}$  cm. longis 8 mm. latis subintegris vel leviter denticulatis, segmentis superioribus brevioribus 3 cm. longis linearibus abrupte ad lobulum segmenti terminalis abeuntibus; segmento terminali lanceolato-lineari basi latissimo 11 cm. longo 2 cm. lato apice gradatim attenuato-acuminatissimo margine regulariter lobulato, lobulis elongato-quadrangularibus inferioribus longioribus 5 mm. longis totiusque latis vel minus latis apice oblique acutis margine subintegris ad acumen 4 cm. longum integro; pinnis inferioribus longissimis longissime linearibus 26 cm. longis 2 cm. latis a basi usque ad  $\frac{3}{4}$  æquilatis sursum gradatim angustioribus ad acumen 4 cm. longum abeuntibus margine regulariter lobulatis, lobulis quadrangularibus 4 mm. longis totiusque latis apice oblique truncatis ad summum late acutis margine subintegris ciliolatis; rhachis frondis complanato-tetragono-teres medio  $2\frac{1}{2}$  mm. lata supra profunde sulcata latere leviter canaliculata straminea supra adpresse densissime pilosa subtus tenuissime pilosa glandulis minutis punctata; costa pinnarum supra tenuiter elevata subtus prominente elevata supra tenuissime sulcata densissime brevissime pilosa subtus subglabra, venis venulisque utraque pagine elevatis subrectis; pagina utraque plus minus minute hirsutis, pilis



unicellularibus. Textura herbacea in exsiccatō membranacea, pagina supra fuscens subtus pallidiora; pinnis inferioribus a rhachide frondis angulo 70° egressis superioribus angulo 40° egressis, infinis plus minus reflexis deorsum recurvis, pinnis cæteris subrectis vel sursum tenuiter recurvis; costæ lobulorum inferiores a rhachide pinnarum angulo 70° egressæ rectæ. Sori a basi frondis usque ad infra pinnam terminalem (partibus superioribus lobulorum et acuminibus pinnarum exceptis) dispositi.

HAB. Kōtōshō, leg. T. KAWAKAMI et S. SAKI, Juli. 1912.

**Dryopteris morrisonensis** HAYATA (Fig. 108-A et B) Mater. Fl. Formos. p. 450. *Dryopteris spinulosa* O. KTZE. var. *morrisonensis* HAYATA Mater. Fl. Formos. p. 422.

HAB. Mt. Morrison. ad 12500 ped. alt., leg. U. MORI, Oct. 1906, (No. 2500).

Very near  
*Lastrea Filix-*  
*Mas* var. *odon-*  
*toloma* MOORE,

(BEDD. Fern.  
Brit. Ind. t.  
373), but differs

from it in having bipinnate fronds and denticulate (but not laciniate) indusium.

**Dryopteris oppositipinna** HAYATA Mater. Fl. Formos. p. 450. *Athyrium oppositipinnum* HAYATA Mater. Fl. Formos. p. 441.

HAB. in Monte Morrison, leg. T. KAWAKAMI et U. MORI, Oct. 1906, (No. 1863).

**Dryopteris mingetsuensis** HAYATA sp. nov. (Fig. 109-A-B). Rhizoma crassiusculum ascendens dense squamatum. Stipes 22 cm. longus basi 5 mm. latus intus (supra) profunde sulcatus

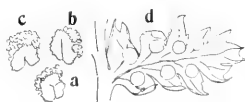


Fig. 108-A, *Dryopteris morrisonensis* HAYATA; a, b, c, sori; d, a portion of a pinnule.



Fig. 108-B, *Dryopteris morrisonensis* HAYATA  $\times \frac{9}{13}$ .

squamatus; squamæ in basi stipitum ovato-lanceolatae vel lineares 1-2 cm. longæ 1-5 mm. latæ apice acuminatissimæ basi haud contractæ margine setulis deorsum recurvis remote instructæ fulvescentes. Frons ovata 40 cm. longa 25 cm.



Fig. 109-A, *Dryopteris mingetsuensis* HAYATA  $\times \frac{1}{2}$ .

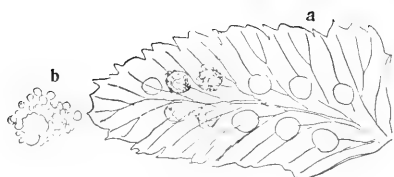


Fig. 109-B, *Dryopteris mingetsuensis* HAYATA;  
a, pinule; b, a sorus.

lata apice cuspidato-acuminata bipinnata basi truncata, pinnis inferioribus suboppositis, superioribus subalternatis, jugis pinnarum inferiorum a se 3-4 cm. distantibus, pinnis infimis in-

ferioribus mediis subæquilongis totis ascendentibus, superioribus gradatim brevioribus sursum subito brevioribus versus apicem ad dentem reductis, pinnis infimis lineari-lanceolatis 20 cm. longis 6 cm. latis apice longe cuspidato-acuminatis basi usque ad prope apicem pinnatis basi subsessilibus vel petiolulatis (petiolulis 5 mm. longis) æquilateralibus, pinnulis mediis longissimis inferioribus et superioribus brevioribus alternis, mediis (uno latere) se 1 cm. distantibus lineari-oblongis  $2\frac{1}{2}$  cm. longis 1 cm. latis apice obtusissimis basi truncatis latere superiore latiore quam latere inferiore, latere superiore basi 7 mm. latis truncatis cum rhachide parallelis latere inferiore basi 3 mm. latis obtusis vel acutis margine duplicato-serratis, serris primariis 4 mm. latis 1-2 mm. longis serrulis 4 instructis, serrulis cuspidiformibus acutis subaristatis minutis; pinnulis basi latere superiore auriculatis. Frons a medio sursum toto sorifera. Sori secus costas pinnularum utroque latere costæ 1-seriatim dispositi a costa 1 mm. a margine 2-3 mm. distantes. Stipes cum rhachide fulvo-stramineus nitidus; rhachis dorso squamata supra (intus) glabra profunde sulcata; rhachis pinnarum sulcata: costis pinnularum et venis supra profunde impressis subflexuosis subtus tenuiter elevatis, pinnis mediis a rhachide frondis angulo  $50^{\circ}$ - $70^{\circ}$  egressis, pinnulis a rhachide pinnarum angulo  $70^{\circ}$  egressis. Textura crassiuscula chartacea in vivo atroviridissima subtus pallida; pagina frondis supra glaberrima subtus ad venas squamis piliformibus conspersa. Indusium minutum rotundato-cordatum margine erosum  $\frac{1}{2}$  mm. in diametro.

HAB. Mt. Arisan: inter Mingetsu et Senninbora, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

Near *Dryopteris Sabæi*; but distinguishable from it only by the much larger thicker frond and much narrower scales.

***Dryopteris pseudo-Sabæi*** HAYATA sp. nov. (Fig. 110-A-B). Rhizoma crassissimum ascendento-suberectum dense squamatum apice caespitosim frondigerum. Stipes 26 cm. longus stramineus basi dense sursum sparse squamatus deorsum 3-4 mm. crassus intus late canaliculatus; squamis basis stipitum ovato-lanceolatis vel lanceolatis 1-2 cm. longis 2-8 mm. latis apice lineari-acuminatis basi plus minus contractis tenuissimis semihyalinis margine serrulis deorsum recurvis instructis castaneis vel rubescentibus. Frons 45 cm. longa 30 cm. lata ovata apice caudato-acuminata basi sub-truncata bipinnata, pinnis æquilateralibus

haud auriculatis inferioribus suboppositis, superioribus alternis, jugis pinnarum inferiorum a se 5-6 cm. remotis, pinnis superioribus gradatim minoribus, pinnis infimis lineari-oblongis 18 cm. longis 6 cm. latis apice caudato-acuminatis basi obtusis vel truncatis breve petiolulatis (petiolulis 8 mm. longis) pinnatis, pinnulis alternis oblongo-linearibus  $3\frac{1}{2}$  cm. longis 18 mm. latis apice obtusis basi truncatis sessilibus pinnatifidis, segmentis infimis quadrangularibus 8 mm. longis 5 mm. latis apice truncatis latere subintegris vel obscure serrulatis apice ad partem truncatam distincte ascendento-serrulatis, serrulis triangularibus apice cuspidato-acutis, serrulis distinctis 5-6; pinnis inferioribus oppositis, jugis a se 5 cm. remotis; rhachis frondis sparse squamata intus



Fig. 110-A, *Dryopteris pseudo-Subei* HAYATA; a, a pinnule; b, a sorus; c, basal portion of a scale on the stipe, showing the cellular structure.



Fig. 110-B, *Dryopteris pseudo-Subei* HAYATA  $\times \frac{1}{3}$ .

sulcata; rhachis pinnarum dorso complanata subulata, costis pinnularum supra vix vel haud impressis subtus plus minus elevatis nigro-coloratis, venis venulis subtus distincte visis nigro-coloratis; textura coriaceo-chartacea vel chartacea, pagina supra viridis subtus pallidissima ad costam venamque subtus pilis globuliformibus 2-cellularibus brevissimis sparsissime conspersa supra glaberrima subtus subglabra; rhachis frondis subtus squamis minutis vermiformibus  $\xi$ -for-

miter recurvis 1-2mm. longis linearibus conspersa; frons medio sursum sorifera. Sori secus costam pinnularum 1-seriatim siti, a costa  $1\frac{1}{2}$ mm. a margine 5mm. distantes. Indusium rotundato-cordatum fulvum  $2\frac{1}{2}$ mm. in diametro.

HAB. Arisan: Mingetsu, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

Very closely resembles *Dryopteris Sabiei* C. CH. in its habit, frond-texture and colour, in the position of sori and in many other points; but distinguishable from it by the structure of the scales and venation of the pinnules.

This is one of the ferns which are represented in Japan by closely allied species. Among them, I may mention *Dryopteris pseudo-Sieboldii* HAY. for *D. Sieboldii* O. KTZE., *D. quadripinata* HAY. for *D. Miqueliana* C. CH., *D. fluvialis* HAY. for *D. serrulato-dentata* Mk. and the present fern for *D. Sabiei* C. CH.

***Dryopteris reflexipinna*** HAYATA Ic. Pl. Formos. IV. p. 174, (Fig. 113).

Very distinct species for its zigzag flexuose rhachis and reflexed pinnae. Somewhat resembles *Lastrea undulata* THWAITES, (BEDD. Fern. South Ind. t. 271), but greatly differs from it by the herbaceous membranaceous fronds and obtusely lobed pinnules. *D. reflexipinna* HAYATA resembles *D. Maximowiczii* in its texture and habit, while it comes near *D. undulata* in its reflexed pinnae.

***Dryopteris sacholepis*** HAYATA sp. nov. (Fig. 111). Rhizoma ascendente-erectum apice dense frondigerum, frondibus caespitosis. Stipes circ. 10cm. longus dimidium frondis aequans basi dilatatus, partibus dilatatis lanceolatis basi plus minus contractis supra basin latissimis 6mm. latis apice gradatim attenuatis fusco-purpureis complanatis squamatis, partibus supra partem basilarem gracilibus subteretibus fusco-purpureis 1mm. latis vel latioribus supra sulcatis minute squamatis sub lente plus minus muricatis sursum stramineis. Frons pinnata vel bipinnatifida lanceolata vel triangulari-vel ovato-lanceolata 21cm. longa 11cm. lata apice acuminata longe caudato-acuminata basi latissima sursum angustior, pinnis approximatis margine contactis utroque latere 20-25, a mediis deorsum inferioribus aequilongis vel mediis longissimis inferioribus paullo brevioribus, superioribus gradatim brevioribus versus apicem ad dentem acuminis reductis, pinnis mediis longissimis linearibus sessilibus 5cm. longis 12mm. latis a medio deorsum aequilatis a medio sursum gradatim angustioribus apice acuminatis

basi truncatis fere ad rhachin pinnatifidis, segmentis se approximatis mediis oblongo-quadrangularibus 7 mm. longis 4 mm. latis apice truncatis plus minus falcatim recurvis vel rectis basi latere inferiore decurrentibus basi latere superiore obscure auriculiformibus vel haud auriculiformibus margine denticulatis; pagina membranacea herbacea supra puberula subtus costa excepta subglabra; rhachis dorso complanata supra straminea subtus castaneo-straminea medio profunde distincteque 1-sulcata, costis pinna- rum supra minus elevatis subtus plus prominente elevatis stra-



Fig. 111; *Dryopteris sachalepis* HAYATA  $\times \frac{3}{4}$ .

mineis supra plus hirsutis subtus haud hirsutis sed pauce squamatis; pinnis a rhachide angulo recto vel angulo  $100^\circ$  divaricatis, pinnis inferioribus generaliter deorsum reflexis; segmentis a rhachide pinna- rum angulo  $90^\circ$  divaricatis. Squamæ basis stipitis lineares 5 mm. longæ  $\frac{2}{3}$  mm. latæ apice acuminatæ; squamæ rhachis frondis parvæ lanceolatæ acuminatæ 1 mm. longæ  $\frac{1}{2}$  mm. longæ reflexæ intus valde concavæ saccoformes extus convexæ castaneæ; pagina frondis supra

pilis rectis laud articulatis multi-cellularibus conspersa. Sori sub lobis pinnularum prope marginem siti rotundati  $\frac{1}{2}$ – $\frac{3}{4}$  mm. in diametro. Indusium minutum cordatum  $\frac{1}{4}$  mm. longum totiusque latum margine pauce ciliolatum.

HAB. Mt. Arisan, leg. T. SŌMA, Dec. 1914.

Near *Dryopteris Kawakamii* HAYATA, but differs from it by the sori locating very near the margin, and by the straight (not curled) hairs on the fronds.

***Dryopteris* (*Leptogramma*) *Somai* HAYATA sp. nov.**

(Fig. 112) Rhizoma? Stipes circ. 60 cm. longus basi squamatus cum cicatricibus squamarum —formibus elevatis muricatum notatus nitidus castaneus complanatus supra latissime canaliculatus subtus extus convexus sursum subtus stramineus supra castaneus medio 5–6 mm. latus. Frons pinnata in ambitu lanceolata 80–100 cm. longa 30 cm. lata apice acuminata basi subtruncata, pinnis mediis longissimis superioribus brevioribus versus apicem ad dentem acuminis reductis, inferioribus brevioribus, infimis brevissimis 13 cm. longis; mediis longissimis linearibus 18 cm. longis basi latissimis 7 cm. latis medio 4 cm. latis apice acuminatissimis sessilibus a medio deorsum fere usque ad rhachin pinnatifidis a medio sursum pinnatilobis, segmentis superioribus gradatim minoribus versus apicem ad lobos acuminis reductis, pinnulis infimis lateris inferioris longissimis 4–5 cm. longis, pinnulis infimis lateris superioris minus longis 3 cm. longis oblongo-linearibus vel quadrangularibus basi latissimis 1 cm. latis apice obtusis vel obtusissimis margine pinnatilobis, lobis quadrangularibus apice truncatis 3 mm. longis 2 mm. latis basi haud contractis haud latioribus. Pagina frondis membranacea herbacea supra minus subtus plus puberula viridissima; rhachis frondis dorso complanata medio 4–5 mm. lata supra fusco-castanea subtus castanea nitida supra latissime canaliculata, canaliculis 3–4 mm. latis intus tenuiter hirsutis; costa pinnarum



Fig. 112; *Dryopteris Somai* HAYATA  $\times \frac{1}{10}$ .

supra minus elevata densissime hirsuta subtus plus elevata dorso complanata sparse hirsuta pallido-straminea; venis venulis apice elevatis; pinna subopposita, mediis a se 8 cm. remotis, inferioribus plus remotis, superioribus approximatis, segmentis pinnarum approximatis margine se contactis; pinnis mediis superioribus a rhachide angulo  $60^\circ$  egressis, infimis plus minus deorsum reflexis. Sori ad medium inter costam et marginem siti rotundati pauce sporangiiferi, sporangiis setosis. Indusium nullum.

HAB. Mt. Arisan: Niman-daira, Jan. 1915. leg. T. SŌMA.

Remarkable for the setulose sporangia.

***Dryopteris subfluvialis***

HAYATA sp. nov. (Fig. 113-A-B).

Rhizoma crassum ascendens dense squamatum apice frondem subsolitariter emittens. Squamæ rhizomatis fusco-castaneæ lineari-lanceolatæ 1-2 cm. longæ 1-2 mm. latæ apice lineari-acuminatæ basi truncatæ haud cordatæ. Stipes 21 cm. longus basi 6 mm. crassus basi squamatus supra basin sursum glaber in sectione subtetragonus stramineus intus

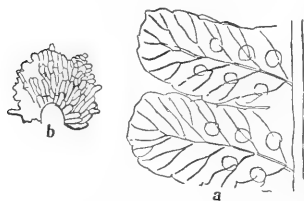


Fig. 113-A, *Dryopteris subfluvialis* HAYATA; a, a portion of a pinnule; b, an indusium.



Fig. 113-B, *Dryopteris subfluvialis* HAYATA  $\times \frac{5}{7}$ .



sulcatus. Frons bipinnata in ambitu ovato-triangularis 50 cm. longa basi latissima 40 cm. lata apice triangulari-acuta vel triangulari-acuminata basi subtruncata; pinnis inferioribus suboppositis, jugis inferioribus a se 6-7 cm. remotis, pinnis inferioribus juxta pinnae inferiores longissimis sursum gradatim brevioribus versus apicem ad dentem reductis, pinnis inferioribus longissimis 25 cm. longis lineari-lanceolatis apice triangulari-acuminatis 11 cm. latis sessilibus vel brevissime petiolatis pinnatis; pinnulis inferioribus juxta pinnulam infimam longissimis 5 cm. longis lineari-lanceolatis 18 mm. latis, superioribus gradatim minoribus versus apicem ad dentem reductis, pinnulis inferioribus apice acuminatis sessilibus pinnatifidis; segmentis inferioribus juxta segmentum infimum longissimis elongato-quadrangularibus 8 mm. longis 4 mm. latis, superioribus gradatim minoribus versus apicem ad dentem reductis, segmentis inferioribus apice truncatis margine serrulatis; textura herbaceo-membranacea, pagina utraque subglabra ad rachin costas costulasque sub microscopio minute squamato-pilosa exsiccatō supra fuscens subtus viridescens. Rhachis frondis in sectione tetragona inferiore  $2\frac{1}{2}$  mm. crassa intus sulcata straminea glabra nitida; rhachis pinnarum alata inferiore cum alis  $1\frac{1}{2}$  mm. lata complanata intus tenuissime sulcata intus supra plus minus pilis crispatis conspersa subtus glabra straminea; costula pinnularum supra plus elevata brevissime crispato-hirsuta subtus minus elevata; costulis segmentorum pinnularum utraque pagine tenuissime elevatis; venulis haud vel vix visis; pinnis inferioribus a rachide frondis angulo  $80^{\circ}$ - $70^{\circ}$  egressis, pinnulis inferioribus a rachide pinnarum angulo  $90^{\circ}$  egressis, costa segmentorum a rachide pinnularum angulo  $80^{\circ}$ - $85^{\circ}$  egressis; pinnulis inferioribus alternis utroque latere a se 2 cm. remotis; segmentis pinnularum approximatis; pagina frondis ad costas venas utraque sparse pilosa, pilis multi-cellularibus; frons subtus per totas pinnae sorifera. Sori utroque latere costulae segmentorum pinnularum 1-seriatim dispositi. Indusium rotundato-cordatum minutum 1 mm. in diametro margine crosso-serratum.

HAB. Mt. Arisan: inter Karapin et Funkiko, leg. TAKEO ITÔ et B. HAYATA, Mart. 1914.

**Dryopteris Takeoi** HAYATA sp. nov. (Fig. 114 A-B). Rhizoma crassum ascendens cum reliquis stipitum  $3\frac{1}{2}$  cm. crassum densissime squamatum, radicibus incrassatis pauca vel haud ramosis teretibus 1 mm. in diametro, apice frondes 2-4

emittens. Squamæ basis stipitum dense crispatae castaneo-rubescens longissime lineares 1-1½ cm. longæ basi 1 mm. latæ haud cordatæ margine integræ. Stipes 16-22 cm. longus deorsum 2-3 mm. latus nitidus albo-stramineus plus minus purpurascens semi-teres supra subplanus subtus convexus supra costatus, costis sursum ½ mm. latis medio tenuissime sulcatis, sursum subglaber. Frons oblongo-lanceolata vel ovato-lanceolata 27-35 cm. longa 12-16 cm. lata apice caudato-acuminata basi in ambitu subtruncata bipinnata, pinnis infra medium longissimis 7-10 cm. longis, inferioribus gradatim brevioribus ad basin pinnae



Fig. 114-A, *Dryopteris Takeoi* HAYATA; a, a pinnule; b, a portion of a pinnule; c, an indusium; d, basal portion of a scale.



Fig. 114-B; *Dryopteris Takeoi* HAYATA  $\times \frac{1}{2}$ .

infimas 6-8 cm. longas abeuntibus, superioribus gradatim brevioribus versus apicem ad dentem acuminis abeuntibus; pinnis juxta mediam longissimis 7-10 cm. longis  $1\frac{1}{2}$ - $2\frac{1}{2}$  cm. latis lineari-lanceolatis apice longissime tenuissime caudato-acuminatis basi latissimis breve petiolulatis (petiolulo 2-3 mm. longo) latere superiore latioribus quam latere inferiore pinnatis, pinnulis infimis lateris superioris longissimis elongato-lineari-triangularibus  $1\frac{1}{2}$ -2 cm. longis 6-7 mm. latis apice acutis vel acuminatis ad summum breve aristatis pinnatifidis (segmentis oblongis) basi brevissime petiolulatis latere superiore (i.e. exteriori) latioribus quam latere inferiore (i.e. interiori), pinnulis superioribus minoribus versus apicem ad dentem acuminis pinnæ reductis, acuminibus pinnarum longissimis linearibus iis pinnarum mediarum 1- $1\frac{1}{2}$  cm. longis 1- $1\frac{1}{2}$  mm. latis ascendento-serrulatis ad apicem brevissime aristatis; pinnulis infimis lateris superioris ab axillis 2-3 mm. remotis, pinnulis infimis lateris inferioris ab axillis 4-5 mm. remotis; pinnis inferioribus a rhachide frondis angulo 70° egressis utroque latere a se 3- $3\frac{1}{2}$  cm. remotis, pinnulis inferioribus a se utroque latere costæ pinnarum 6-7 mm. remotis cum sinu inter pinnulas æquilatis vel plus approximatis, a costa pinnarum angulo 80° egressis; pinnis totis subrectis sursum plus minus falcato-ascendentibus, pinnulis subrectis haud vel vix falcatis. Textura tenuiter coriacea vel chartacea, pagina supra in vivo fulvo-viridis subtus pallidior in exsiccato supra fusco-fulvenscens; rhachis frondis et pinnæ dorso complanata supra profunde sulcata, sulcis intus patento-pilosis, dorso glabra; costis venisque pinnularum utraque pagine tenuiter elevatis. Pagina frondis supra glabra subtus ad costas venas sparsissime pilis multicellularibus conspersa. Frons per totam paginam sorifera. Indusium subcordatum margine crosso-fimbriatum.

HAB. Mt. Arisan: Hasegawakei, ad 7000 ped. alt., in arido crescens, leg. TAKEO Itō, Aprili. 1914.

The sorus of this fern is not exactly the type of *Dryopteris*, but is rather of the *Athyrium*-type.

***Dryopteris transmorrisonensis*** HAYATA (Fig. 115). Ic. Pl. Formos. IV. p. 187. *Polystichum transmorrisonense* HAYATA Mater. Fl. Formos. p. 427.

***Dryopteris ursipes*** HAYATA sp. nov. (Fig. 116). *Polystichum ursipes* HAYATA in schid. Herb. Tōkyō. Rhizoma ignotum. Stipes plus 15 cm. lon-

gus densissime squamatus medio  $2\frac{1}{2}$  mm. latus dorso complanatus supra late canaliculatus, canaliculis medio tenuissime sulcatis, stramineus. Frons pinnata ovato-lanceolata 43 cm. longa 20 cm. lata apice caudato-acuminata basi truncata, pinnis mediis longissimis superioribus gradatim brevioribus minoribus versus apicem ad dentem ascendentem acuminis abeuntibus, inferioribus gradatim minoribus brevioribus basi ad pinnam infimam 7 cm. longam abeuntibus; pinnis mediis sessilibus linearibus 10 cm. longis 2 cm. latis basi latissimis sursum gradatim angustioribus apice ad acumen caudatum abeuntibus deorsum circ. ad rhachin pinnatifidis, segmentis subæquilongis subæquiformibus inferioribus elongato-quadrangularibus 1 cm. longis basi plus minus dilatatis 5 mm. latis apice truncatis vel obtusissimis latere subintegris apice denticulatis, dentibus minutis triangularibus plus minus recurvis, segmentis superioribus gradatim minoribus versus apicem ad dentem acuminis ascendentem abeuntibus; textura chartacea vel tenuiter coriacea, pagina in exsiccatō supra fuscens subtus pallida, utraque pagine ad costam plus minus minute squamata; pinnae inferiores suboppositae, jugis a se  $2\frac{1}{2}$  cm. remotis, superiores subalternatae, sinibus inter segmenta angustissimis basi acutis; pinnis mediis a rhachidibus frondium angulo recto egressis superioribus plus minus ascendentibus generaliter angulo  $80^\circ$  egressis; inferioribus plus minus deorsum reflexis a rhachidibus frondium angulo  $100^\circ$  egressis, segmentis inferioribus a rhachidibus pinnarum angulo  $80^\circ$  egressis; rhachis frondis dense squamata dorso complanata 2 mm. lata per totam longitudinem costata, costis profunde sulcatis, sulcis ad ramificationem latoribus; costae pinnarum a costa rhachis frondis oriundae supra plus minus elevatae sed late canaliculatae vermiforme flexuosae plus minus squamis conspersae subtus elevatae deorsum squamis instructae; costis venis venulisque segmentorum pinnarum supra impressis subtus elevatis fusco-coloratis, venis a basi



Fig. 115; *Dryopteris transmorri-sonensis* HAYATA  
×  $\frac{1}{2}$ .

furcato-2-ramosis, ramis parallelis ad marginem attingentibus. Squamæ rhachis frondis lineari-lanceolatae 1 cm.-1½ cm. longæ basi latissimæ 1 mm. latæ apice subulato-acuminatæ basi leviter cor-

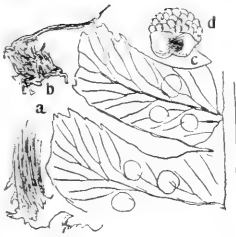


Fig. 116, *Dryopteris ursipes* HAYATA; a, a basal portion of a scale on the rhizome; b, a scale on a segment of the frond; c, segments of a pinna; d, a sorus.

datæ margine prope basin serratæ cæterum integræ. Frons medio sursum sorifera. Sori secus costas segmentorum pinnarum utroque latere 1-seriatim prope costam segmentorum et costas pinnarum ab apice segmentorum remote siti. Indusium profunde cordatum. Pagina frondis supra glabra subtus ad costas segmentorum minute squamata, squamis rotundatis apice longissime caudatis, caudis filiformibus, margine crosis cum caudis 1½ mm. longis ⅓ mm. latis.

HAB. Mt. Morrison, ad 7000 ped. alt., leg. U. MORI, Oct. 1906, (No. 1881).

Very near *Dryopteris polylepis* C. CH., but distinguishable from it by the sori locating very near the costa or costules. Also allied to *D. pachyphalla* HAY., but separable from it by the pinnae and by the blackish brown scales on the stipes.

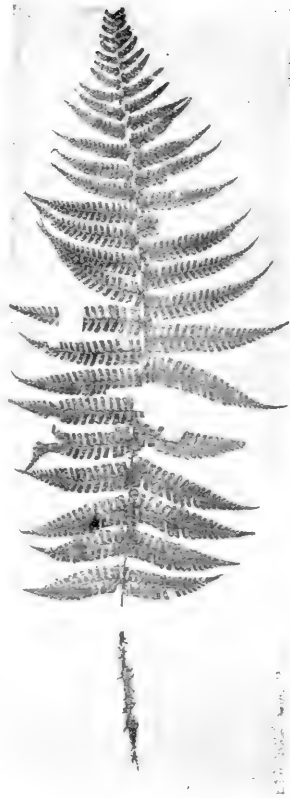


Fig. 116; *Dryopteris ursipes* HAYATA.

### *Elaphoglossum* SCHOTT.

*Elaphoglossum laurifolium* (THOUARS) MOORE (Fig. 117-A-B) BEDD. Fern.

South Ind. t. 200; *Acrostichum angulatum* MOORE; BLUME Fl. Jav. Fil. t. 6. Rhizoma ad saxum firme repens teres  $1\frac{1}{2}$  mm. in diametro longissimum dense squamatum laxiuscule frondigerum, frondibus a se  $1\frac{1}{2}$  cm. remotis; squamis rhizomatis rubro-stramineis ovato-oblongis 5-6 mm. longis  $2\frac{1}{2}$  mm. latis apice breve acuminatis vel cuspidibus instructis basi rotundatis profunde cordatis, lobis cordis valde imbricatis, margine crosis. Frons sterilis: stipes 9-13 cm. longus basi dense sursum sparse squamatus basi fusco-nigro-castaneus supra



Fig. 117-A, *Elaphoglossum laurifolium* MOORE,  $\times \frac{6}{11}$ .

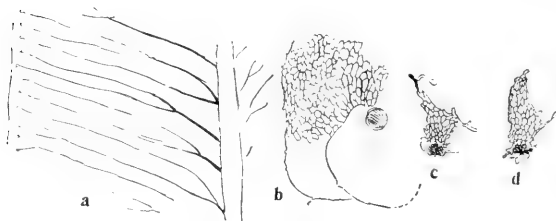



Fig. 117-B, *Elaphoglossum laurifolium* MOORE; a, a portion of the frond; b, basal portion of a scale on the rhizome; c, d, scales on the frond.

basin sursum castaneus dorso complanatus vel tetragonus in sectione -formis per totam longitudinem intus prominente costatus,

costa medio profunde angustissimeque sulcata, subtus convexus; frons oblongo-linearis vel lanceolata 9–11 cm. longa 2–3 cm. lata apice cuspidato-acuminata basi obtuso-acuta margine subintegra vel eroso-denticulata cartilagineo-marginata, partibus cartilagineis  $1\frac{1}{2}$  mm. latis rubro-fulvescentibus, simplex, costa utraque pagine tenuiter elevata complanata  $\frac{1}{2}$  mm. lata castaneo-rubescenti supra tenuissime sulcata, venis lateralibus tenuissimis haud vel vix visis a costa angulo  $70^\circ$  egressis multissimis, venulis ad marginem attingentibus; textura valde coriacea, pagine in vivo supra atro-viridissima subtus pallidior supra glabra subtus ad costam sparse squamata ad paginam squamis minutis sparse conspersa, squamis ovatis vel amceboideis  $\frac{1}{2}$ –2 mm. longis  $\frac{1}{4}$ – $\frac{1}{2}$  mm. latis margine erosis interdum setis longiusculis 1–2 instructis. Frons fertilis: stipes quam iis frondium sterilium longior; sed frons quam iis frondium sterilium brevior et minor in exsiccato chartacea vel tenuiter coriacea tenuiora quam iis frondium sterilium subtus per totam paginam densissime sorifera.

HAB. Mt. Arisan: inter Tozan et Mingetsu ad 7000 ped. alt., leg. TAKEO Irō et B. HAYATA, Aprili. 1914.

*Hypolepis* BERNH.

***Hypolepis alte-gracillima*** HAYATA sp. nov. (Fig. 118–A–B). Rhizoma repens teres fuscens minute squamato-pilosum, pilis rubro-castaneis 3 mm. longis 16–17-cellularibus,  $2\frac{1}{2}$  mm. in diametro apice ad frondem solitariam abeuns subtus radices emittens, radicibus fibrosis ramosis. Stipes 45 cm. longus teres medio 4 mm. in diametro fulvo-rubescens basi squamato-pilosus scabriusculus supra basin sursum subglabratus intus angustissime profunde sulcatus. Frons 70 cm. longa 43 cm. lata ovata apice in ambitu cuspidato-acuminata basi in ambitu obtriangularis bipinnata vel subtripinnata, pinnis inferioribus juxta pinnam infimam longissimis superioribus gradatim brevioribus versus acumen ad dentem acuminis reductis, pinnis infimis 26 cm. longis, pinnis inferioribus juxta pinnam infimam longissimis 30 cm. longis 11 cm. latis triangulari-lanceolatis apice gradatim acuminatissimis basi latissimis subtruncatis latere inferiore latioribus quam latere superiore pinnatis, pinnulis inferioribus longissimis superioribus gradatim minoribus versus acumen ad dentem reductis, pinnulis inferioribus triangulari-linearibus 6 cm. longis 2 cm. latis basi latissimis subæquilateralibus apice acuminatis ad summum obtusis pinnatifidis, segmentis

oblongo-elongato-quadrangularibus inferioribus longissimis superioribus gradatim minoribus versus apicem ad dentem ascendentem acuminis reductis, segmentis inferioribus 1 cm. longis 4 mm. latis apice obtusissimis vel truncatis basi plus minus contractis ad costam pinnularum adnatis ad rhachin 1 mm. latam pinna-tilobis, lobis quadrangularibus longioribus quam latioribus superioribus in-



Fig. 118-A, *Hypolepis alte-gracillima* HAYATA; a, a hair on the frond; b, a pinnule; c, soriferous margin of a lobe of a pinnule; d, a sorus.

ferioribus subaequilongis conformibus utroque latere segmentorum 4-5 apice subtruncatis 2-3-dentatis caeterum subintegris  $1\frac{1}{2}$  mm. latis totiusque longis vel longioribus; textura herbacea membranacea, pagina in vivo pallido-viridis in exsiccatō supra fusco-rubescens subtus pallido-rubescens utraque pagine sparse squamato-pilosa, pilis crispatis; rhachis frondis pinnarum vel pinnularum supra profunde sulcata, sulcis intus pilosis, subtus subglabrata scabriuscula rubescens, costis venis segmentorum supra tenuiter impressis vel haud impressis subtus tenuiter elevatis, pinnis inferioribus suboppositis, jugis a se 10-15 cm. remotis, pinnulis inferioribus suboppositis, jugis a se  $2-2\frac{1}{2}$  cm. remotis, segmentis inferioribus suboppositis, jugis 5 mm. remotis, segmentis superioribus approximatis latere fere attingentibus; pinnis inferioribus a rhachide frondis angulo  $40^{\circ}-45^{\circ}$  egressis,



Fig. 118-B; *Hypolepis alte-gracillima* HAYATA  $\times \frac{1}{5}$ .



subrectis superioribus plus minus sursum recurvis, pinnulis inferioribus a rhachibus pinnarum angulo 80°-90° egressis rectis superioribus angulo 50°-60° egressis subrectis; segmentis pinnularum a rhachide pinnularum inferioribus angulo recto egressis superioribus plus minus ascendentibus. Sori ad marginem basis lateris superioris lobulorum pinnularum ordinis secundarii singulariter dispositi partibus recurvis marginis lobulorum frondis subobtecti.

HAB. Nimandaira, leg. TAKEO ITÔ et B. HAYATA, Aprili. 1914.

Near *Hypolepis tenuifolia* BERNH.; but differs from it by the much thinner fronds with quite obtusely lobed terminal segments. Also near *Hypolepis punctata* METT. (= *Dryopteris punctata* C. CH.), but easily distinguishable from it by the chestnut coloured stipes and rhachis, and by the dark coloured fronds in dried specimens.

***Leptochilus* KAUL.**

***Leptochilus angustipinnus* HAYATA sp. nov.** (Fig. 119). Rhizoma? Frons sterilis: Stipes 30 cm. longus medio 2½-3 mm. latus basi minute densiuscule squamatus, squamis polygono-oblongis subamœboideis 1 mm. longis ½ mm. latis, stramineus plano-convexus in sectione supra planus subtus convexus supra 4-5 sulcatus; frons ovato-triangularis 45 cm. longa 30 cm. lata medio latissima basi minus lata vel æquilata vel latior apice caudato-acuminata basi in ambitu truncata pinnata, pinnis linearibus infimis 16 cm. longis, pinnis mediis sub-æquilongis superioribus gradatim brevioribus minoribus, versus apicem frondis ad pinnas laterales superimas minimas 4-5 cm. longas abeuntibus; pinna terminali subito longior pinnas superrimas laterales in longitudine 3-4-plo superanti vel interdum perfecte obsoleta et ad prolem reducta; pinna infima linearis 15-16 cm. longa 2 cm. lata apice gradatim acuminatissima, acuminibus minus quam 3 mm. latis 2 cm. longis, medio deorsum æquilata basi late triangulari-acuta margine repandula, repandulis mediis 4 mm.

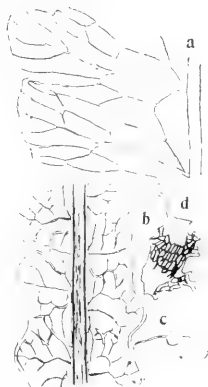


Fig. 119, *Leptochilus angustipinnus* HAYATA; a, a portion of a pinna of a sterile frond; b, a portion of a pinna of the fertile frond; c, cross section of the same; d, a scale on the stipe.

latis  $1\frac{1}{2}$  mm. longis apice rotundatis plus minus ascendentibus; pagina membranacea vel tenuiter chartacea supra glabra subtus ad vel prope costas leviter tenuiterque minute squamata, in exsiccatō viridescens, costis venis utraque pagine elevatis tenuissimis gracillimis, venis a costa angulo  $60^\circ$  egressis, venulis gracillimis sub luce transversa distincte visis reticulatis, reticulis costalibus mediis triangularibus 5 mm. longis  $1\frac{1}{2}$  mm. latis, venis lateralibus mediis 5 mm. a se remotis; pinnis alternis mediis a se (utroque latere)  $2\frac{1}{2}$ –3 cm. remotis, pinnis inferioribus brevioribus petiolulatis, mediis superioribus subsessilibus vel sessilibus, pinnis inferioribus a rhachide frondis angulo obtuso, pinnis mediis superioribusque a costa angulo  $45^\circ$  egressis; rhachis frondis dorso complanata plus minus minute squamata medio  $1$ – $1\frac{1}{2}$  mm. lata supra sulcata ad medium sulcorum tenuiter costata, costis venis venulis pinnarum utraque tenuiter elevatis, venulis anastomosantibus. Frons fertilis cum ea sterili æquilonga æquilata, pinnis angustissimis linearibus 15 cm. longis 7 mm. latis apice acuminatissimis basi triangulari-acutis subsessilibus vel breviter petiolatis (petiolis 1–2 mm. longis) margine leviter regulariter lobulatis vel repandulis, lobulis  $1\frac{1}{2}$  mm. longis  $3\frac{1}{2}$  mm. latis apice rotundatis; costa supra elevata, venis supra elevatis a costa angulo recto egressis vermiforme recurvis, venulis reticulatis. Frons per totam paginam densissime sorifera.

HAB. Prope Hokkōkei, leg. C. OWATARI, Jan. 1898; Toroku: Hōzan, leg. U. MORI, Nov. 1906, (No. 2338); Mt. Arisan, inter Funkikō et Karapin, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near *Leptochilus virens*, but separable from it by the much longer and narrower pinna.

**Leptochilus Kanashiroi** HAYATA sp. nov. (Fig. 120 A, B, C). Rhizoma ascendens apice caespitosum frondigerum. Fr. sterilis: Stipes 25 cm. longus basi fusco-castaneus sursum rubro-castaneus basi complanatus sursum tereto-angulatus in exsiccatō profunde 5–6-sulcatus basi squamatus, squamis linearibus vel lineari-subulatis 5–10 mm. longis  $\frac{1}{2}$ –1 mm. latis apice acuminatissimis basi ad insertionem leviter cordatis vel haud cordatis (♂)-formibus castaneo-rubrescentibus, sursum glaber nitidus medio  $1\frac{1}{2}$  mm. latus basi 3–4 mm. latus. Frons in ambitu triangularis 28 cm. longa totiusque lata vel minus lata 3-foliolata, foliolis lateralibus suboppositis lanceolato-oblongis 15–25 cm. longis 4–6 cm. latis

apice caudato-acuminatis basi acutis sessilibus margine subintegris vel repandis vel repandulis, venis primariis lateralibus utroque latere costæ circ. 20 a costâ angulo  $30^{\circ}$  egressis sursum recurvis prope marginem anastomosantibus, venulis inter venas primarias transversis, venulis secundariis reticulatis, reticulis venulas liberas furcatas includentibus; costis venis venulis utraque pagine tenuiter elevatis; utraque pagina glabra in exsiccato rubescens membranaceo-chartacea:

foliolo terminali simplici vel trifido in ambitu obtriangulari-rhomboidico 20-30 cm. longo totiusque lato apice caudato-acuminato basi subito cuneato ad rhachin decurrenti, segmentis lateralibus oblongo-lanceolatis 15-25 cm. longis 3-6 cm. latis apice acuminatissimis, segmento terminali lanceolato-vel obovato-lanceolato apice caudato-acuminato basi gradatim cuneato ad 1-2 cm. latum attenuato. Fr. fertilis quam ea sterili minor 3-foliolata vel 3-fida in ambitu late ovata, segmentis



Fig. 120-A, *Leptochilus Kanashiroi* HAYATA.

lateralibus 12 cm. longis 3½ cm. latis oblongo-oblanccolatis apice caudato-acuminatis basi obtusis vel sub-cuneatis, segmento terminali oblanccolato 20 cm. longo 5 cm. lato apice cuspidato-acuto basi subito cuneato-attenuato margine repandulo: textura membranacea subtus dense sorifera.

HAB. Loo-choo, Yæyama, Juli. leg. S. KANASHIRO.

Very near *Leptochilus Bonii* C. CH. and *Leptochilus Harlandii* C. CH = *G. decurrens* Hook. (Exot. Fern. t. 94); but distinguishable from them by the much broader pinnae of the fertile fronds. The distinction between this genus and *Polybotrya*, as is defined by DIELS in ENGL. u. PRANTL. Natur. Pfl.-fam., on the basis whether the sori exist only on the swollen veins in the former, or they occupy all over the un-



Fig. 120-B, *Leptochilus Kanashiroi* HAYATA.

der surface of the lamina in the latter, is not very clearly proved to be constant in the Formosan species. But, the two ge-

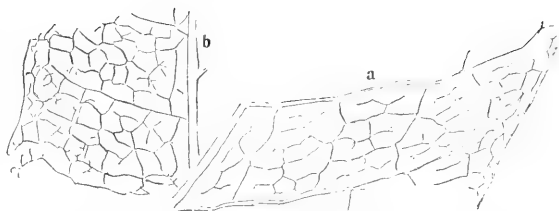


Fig. 120-C, *Leptochilus Kanashiroi* HAYATA; a, a portion of the sterile frond; b, a portion of the fertile frond.

nera are clearly separable each other by the veins, which in *Polybotrya* are all free in both fertile and sterile fronds, but are anastomosing in *Leptochilus*. The distinction of the two genera defined on this basis is the clearly seen in the species just described and *Polybotrya duplicato-serrata* HAYATA appearing in p. 305 of this volume.

***Leptochilus virens* (WALL.) C. CHR. Ind. p. 20.**

*Gymnopteris virens* BEDD. Fern. South Ind. t. 202.

HAB. Banchoryō: Mt. Naiyezan, leg. U. MORI et Y. SHIMADA, Dec. 1907.

The species is not well defined by descriptions; the figures given in BEDD. Fern. South Ind. t. 202 and HOOK et GR. Ic. Fil. t. 221, are considerably different. Whether the plant mentioned here is really *G. virens* or not is entirely questionable.

***Lindsaya* DRY.**

***Lindsaya orbiculata* (LAM.) METT.; MATSUM. et HAYATA Enum Pl. FORMOS. p. 596, form. *lobulata*.**

HAB. Inter Remogan et Rahao, leg. TAKEO ITō et S. FUJII, Nov. 1914.

The form is quite different from the original form of *L. orbiculata* in having obconical cuneate pinnules which are usually lobed at the margin. But, the gradually transitional forms between this and the type have led me to regard this fern to be a mere form of the latter.

***Microlepia* PRESL.**

***Microlepia hirsutissima* HAYATA sp. nov. (Fig. 121 A-B). Rhizoma repens supra 2-seriatim alternatim dense frondigerum subtus dense radiciferum dense**

pilosum, pilis fusco-rubrescentibus. Stipes 12-15 cm. longus subteres basi pilosus sursum glaber basi castaneo-fuscus sursum pallido-stramineus medio  $1\frac{1}{2}$  mm. latus. Frons in ambitu lineari-lanceolata apice gradatim attenuata acuminatissima basi in ambitu truncata basi latissima 5-8 cm. lata a basi sursum gradatim angustior versus apicem gradatim acuminata 16-26 cm. longa pinnata vel bipinnatifida; pinnis infimis longissimis triangulari-oblongis  $3\frac{1}{2}$  cm. longis 2 cm. latis apice acuminatis basi truncatis pinnatifidis, segmentis infimis latere superiore longissimis oblongo-quadrangulatis 8-10 mm.

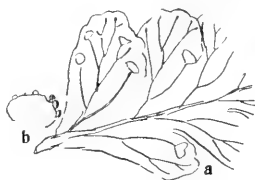


Fig. 121-A, *Microlepia hirsutissima* HAYATA; a, basal portion of a pinna; b, a sorus.

longis 5-8 mm. latis apice truncatis vel obtusis basi oblique late cuneatis margine apiceque duplicato-lobulatis, segmentis superioribus gradatim minoribus versus apicem ad lobos ascendentes reductis, segmentis se valde approximatis ad marginem contactis vel fere imbricatis; pinnis infima excepta superioribus gradatim apice minus acuminatis sensim obtusis versus apicem frondis ad lobos obtusissimos 5-2 mm. longos reductis; pinnis mediis superioribusque basi gradatim obliquioribus latere inferiore angustissime cuneatis latere superiore late auriculatis, pinnis infimis breve petiolatis (petiolis 2-3 mm. longis) superioribus gradatim sessilibus versus apicem frondis ad rhachin adnatis ad lobos abeuntibus; pinnis inferioribus pinnatifidis, superioribus pinnatilibus vel den-



Fig. 121-B; *Microlepia hirsutissima* HAYATA.

tatis. Sori ad latus superius singulorum lorum vel segmentorum medio vel basi singulariter vel geminatim siti venulas terminantes. Frons in textura herbacea membranacea utraque pagine sparse hirsuta; rhachis plano-convexa in sectione, supra plana subglabra subtus convexa hirsutissima supra profunde canaliculata plus minus flexuosa vel subrecta, costis primariis vel costis segmentorum utraque pagine elevatis supra tenuiter subtus densissime hirsutis, venulis utraque pagine tenuissime elevatis distincte visis sparse hirsutis, pinnis inferioribus alternis a se 3 cm. remotis superioribus gradatim approximatis, pinnis inferioribus subfalcatis sursum recurvis a rhachide frondis angulo 50° egressis, superioribus rectis haud falcatis a rhachide frondis angulo 80°-85° egressis.

HAB. Inter Tonroku et Remogan, leg. TAKEO ITÔ et S. FUJII, Nov. 1914, (No. 21).

Near *M. obtusiloba* HAYATA; but differs from it by the bipinnatifid fronds; perhaps a reduced form of the same species.

*Notholaena* R. Br.

**Notholaena hirsuta** Desv. (Fig. 122 A-B). Rhizoma suberectum vel repens fulvo-squamatum dense radicans, radicibus remotissimis pilis fulvis obtectis. Fr. sterilis et fertilis conformes, fertilis in textura quam sterili plus minus crassior, sterilis membranacea in exsiccatō fulvescens supra crispato-pilosa subtus dense tomentosa; fertilis plus minus fuscens supra crispato-pilosa subtus dense rubro-ferrugineo-tomentosa. Stipes circ. 10 cm. longus basi 1½ mm. crassus supra subplanus medio cum rhachidibus tenuissime sulcatus subtus (dorso) rotundatus in sectione fusco-purpurascens basi fulvo-squamatus, (squamis rubro-castaneis linearibus 3 mm. longis basi latissimis ¼ mm. latis apice acuminatissimis margine subintegris vel plus minus erosio castaneo-rubris ad marginem hyalinis haud coloratis), basi glanduloso-pilosus, pilis patentissimis 2-3-cellularibus. Frons oblongo-linearis 16 cm. longa basi 5 cm. lata apice obtuso-acuta bipinnata, pinnis suboppositis, jugis inferioribus a se 2 cm. distantibus, superioribus plus approximatis, pinnis inferioribus triangulari-ovatis 28 mm. longis 18 mm. latis a basi ad apicem triangulari-acutis basi latissimis subsessilibus vel breve petiolulatis, (petiolis 2-3 mm. longis) latere superiore quam latere inferiore angustiore pinnatis, pinnulis lateris inferioris infimis longissimis 1 cm. longis 7 mm. latis triangulari-ovatis pinnatifidis segmentis utroque latere 2 instructis,

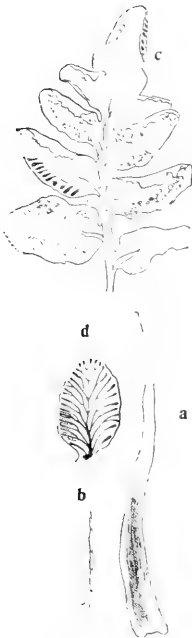


Fig. 122-A, *Notholaena hirsuta* Desv.; a, a scale on the rhizome; b, a hair on the frond-rhachis; c, a pinnule; d, a segment of the same, showing the sori-ferous veins.



Fig. 122-B; *Notholaena hirsuta* Desv.

segmentis infimis latere inferiore longissimis oblongis 5 mm. longis 3 mm. latis apice truncato-obtusis basi truncato-acutis basi latere superiore cum rhachide parallelis, basi latere inferiore acutis; pinnis superioribus gradatim brevioribus versus apicem ad segmenta linearia 1-4 mm. longa reductis; pinnis pinnulis segmentis margine soriferis; rhachis frondis et pinnarum sulcata; venis venulis utraque pagine haud visis. Rhachis frondis dense longe pilosa, pilis longioribus 1-2 mm. longis, haud squamata; pagina frondis supra sparse subtus



densissime crispata pilosa, pilis fulvo-rubescens; frons fertilis margine deorsum recurva eroso-ciliolata. Sori oblongi ab apice venularum clavatarum deorsum usque ad  $1\frac{1}{2}$  mm. vel 2 mm. extensi a se  $\frac{2}{3}$  mm. distantes.

HAB. Horisha, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Compared with a specimen from the Philippines. The above description is drawn from the Formosan collection.

*Peranema* DON.

*Peranema formosana* HAYATA in Tōkyō Bot. Mag. XXVI. p. 110.

*Polybotrya* HUMB. et BONPL.

*Polybotrya duplicato-serrata* HAYATA sp. nov. (Fig. 123-A). Rhizoma repens subteres supra densiuscule frondigerum subtus densissime radiceiferum. Fr. sterilis: stipes 12–16 cm. longus deorsum dense squamatus, squamis fuscis ovato-oblongis vel triangulari-lanceolatis apice acuminatis basi cordatis longe auriculatis circ. 1 mm. longis margine erosis, sursum subglabratus dorso plus minus complanatus intus supra multistriatus fere 3-sulcatus subtus convexus haud striatus lævis sursum  $1\frac{1}{2}$  mm. latus. Frons in ambitu lanceolata 50 cm. longa 11 cm. lata medio latissima apice acuminata basi minus lata in ambitu truncata pinnata, pinnis mediis longissimis subsessilibus  $5\frac{1}{2}$  cm. longis 12 mm. latis linearibus apice acutis sed ad summum obtusis medio usque ad basin aequilatis basi perfecte truncatis ad latus superius plus minus auriculatis vel haud auriculatis subsessilibus vel brevissime petiolatis (petiolis minus quam 1 mm. longis) margine duplicato-serratis, (serris primariis latissimis  $2\frac{1}{2}$  mm. latis 1 mm. longis plus minus ascendentibus subtruncatis margine serrulis 3–4 instructis, serrulis (serris secundariis) brevissimis ascendentibus; textura chartacea utraque pagine subglabra vel plus minus squamis minutis dispersa, costa supra minus subtus plus elevata,

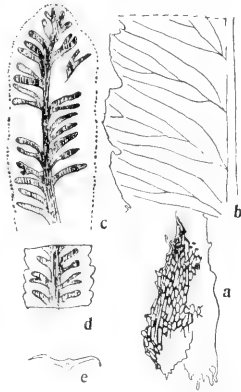


Fig. 123-A, *Polybotrya duplicato-serrata* HAYATA; a, a scale on the rhizome; b, a portion of a pinna of the sterile frond; c, a portion of a pinna of the fertile frond; d, another portion; e, cross section of the same.

venis venulis utraque pagine tenuiter elevatis, venis lateralibus primariis mediis a se  $2\frac{1}{2}$  mm. remotis a costa angulo  $45^\circ$  egressis ad basin venulis singulis utroque latere emittentibus ad medium 1-plo vel 2-plo furcatim ramosis, venulis totis liberis subrectis vel deorsum vel sursum recurvis ad apicem serrarum secundariarum attingentibus; pagina supra in exsiccatō fusco-viridescens subtus pallidior; pinnis inferioribus gradatim minoribus in pinna infima usque ad 4 cm. reductis, superioribus gradatim minoribus ad pinnas superrimas usque ad 5 mm. longas reductis, pinnis inferioribus suboppositis medio superioribus alternis; pinnis inferioribus a se utroque latere 3 cm. remotis, superioribus gradatim approximatis; pinnis a rhachide frondis angulo circ.  $90^\circ$ – $80^\circ$  egressis subrectis sed plus minus basi deorsum apice sursum recurvis. Frons ad apicem interdum prolifera ibique radicans; rhachis frondis minute remoteque squamata supra dorso complanata canaliculata per medium canaliculorum tenuissime 1-costata, costis tenuissimis. Fr. fertilis: Stipes quam is frondis sterilis longior 30–35 cm. longus. Frons in ambitu linearis 20–25 cm. longa 3– $3\frac{1}{2}$  cm. lata apice gradatim attenuata obtusa basi abrupte truncata, pinnis medio deorsum æquilongis breve petiolatis (petiolis 1–2 mm. longis) linearibus 13 mm. longis  $3\frac{1}{2}$ –4 mm. latis apice rotundato-obtusis ab apice usque ad basin æquilatis basi subcordatis pagine coriaceis supra glabris in exsiccatō fulvo-rubescens subtus totis sori-feris margine serrulatis deorsum recurvis, costa supra minus subtus plus elevata; pinnis medio superioribus gradatim minoribus versus apicem ad pinnam oblongo-rotundatam 5 mm. longam reductis.

HAB: Akōchō: Tanashū, leg. G. NAKAHARA, Jan. 1905.

Near *P. appendiculata* J. Sm., but separable from it by the much thinner fertile pinnae, and duplicately serrate sterile pinnae with very short bristles at the sinus.

**Polybotrya marginata** BLUME Fl. Jav. Fil. p. 18, t. 3. Rhizoma repens dense frondigerum. Fr. sterilis: stipes 10–20 cm. longus sparse squamatus, squamis lanceolatis acuminatis 2 mm. longis; frons lineari-lanceolata stipitem  $\frac{4}{3}$ -plo in longitudine æquans 15–25 cm. longa 3–5 cm. lata apice acuminato-pro-longata, (acumine lineari  $3\frac{1}{2}$  cm. longo 3–5 mm. lato recto margine dentato interdum basi prolifero) pinnata, pinnis (infimis superioribus exceptis) omnibus æquilongis, mediis 3 cm. longis 6 mm. latis linearibus margine parallelis apice

obtusissimis basi obliquis latere superiore auriculatis latere inferiore cuneatis subscissilibus margine crenulatis ad sinus crenarum setula singula instructis (setulis 1-2 mm. longis recurvis ascendentibus) supra glabris subtus ad costulas sparse squamatis; pinnis infimis brevioribus plus minus deorsum reflexis superioribus gradatim brevioribus versus apicem abrupte reductis ad dentem acuminis abeuntibus; rhachis semper alata cum alis  $1\frac{1}{2}$  mm. lata; costis rhachis vel pinnæ supra plus subtus minus elevatis gracilibus. Fr. fertilis: stipes quam is sterilis duplo longior; frons linearis 8-12 cm. longa 1-2 cm. lata pinnata apice obtusa basi truncata, pinnis oblongis vel ellipticis vel plus minus elongato-oblongis 3-10 mm. longis 2-5 mm. latis apice obtusissimis basi rotundatis vel leviter cordatis membranaceis suboppositis vel alternis inferioribus a se 1 cm. remotis superioribus plus approximatis subtus dense soriferis, venis soriferis haud vel vix incrassatis; textura rigide membranacea, rhachis haud alata, pinnis brevissime petiolulatis.

*Polybotrya appendiculata* HAYATA, in HAYATA et MATSUM. Enum. Pl. Formos. p. 585 (non J. Sm.).

HAB. Inter Urai et Rahao, leg. K. MIYAKE, Oct. 1899; Kōtōshō, Iao-choo: Okinawa.

The present fern accords exceedingly well with the figures given in BLUME'S *Floræ Javæ*. This and the preceding species were previously confused and altogether regarded to be identical with *P. appendiculata*. After studying a number of the ferns, I have found that there are clearly two forms which are very constant and do not seem to be variable from one to the other. One form represented by *P. duplicato-serrata* HAYATA has the much longer fronds, wingless rhachis and incrassate soriferous veins, while the other, the present species, has always much smaller sterile fronds with winged rhachis and very slightly incrassate soriferous veins. The former differs from *P. appendiculata* in the pinnæ, which are always acuminate at the apex, while the latter accords pretty well with the description of the same species given in HOOKER'S *Sp. Fil.* V. p. 251. According to HOOKER,<sup>1)</sup> CHRIST<sup>2)</sup> and DIELS,<sup>3)</sup> *P. appendiculata* is in the highest degree variable. The description of HOOKER includes many

1) HOOKER, W. J.—*Species Filicum* V. p. 251.

2) CHRIST, H.—*Farnkräuter der Erde* p. 43.

3) DIELS, L.—*ENGL. u. PRANTL Nat. Pfl.—fam. I.—4*, p. 196.

forms which may be easily regarded as distinct species. Although I have not yet seen the specimens of the named species, I suspect if *P. appendiculata* may not be a collective name for at least two different valid species. Our ferns, which might be regarded as forms of the same species, are very constant and are never variable.

*Polypodium* LINN.

***Polypodium aspidistrifrons* HAYATA sp. nov.**



Fig. 123-A; *Polypodium aspidistrifrons* HAYATA  $\times \frac{1}{2}$ .

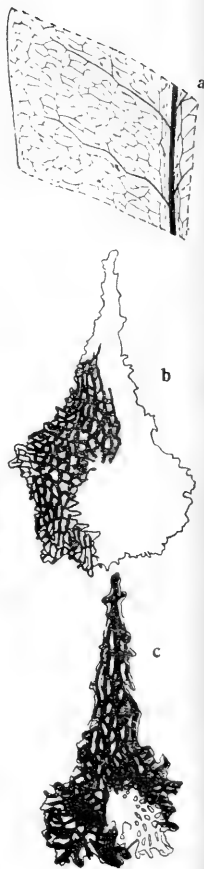


Fig. 123-B, *Polypodium aspidistrifrons* HAYATA: a, a portion of a frond, natural size; b, a scale on the rhizome; c, a scale on the surface of the frond, greatly magnified.

(Fig. 123-A-B). Rhizoma repens dense adpresse squamatum, squamis fusco-nigricantibus caudato-cuspidato-ovatis  $1\frac{1}{2}$ -2 mm. longis 1 mm. latis apice cuspidato-ovatis basi profunde cordatis, lobis cordis valde imbricatis margine eroso-serrulatis, 5-6 mm. crassum supra alternatim densiuscule frondigerum. Frondes approximate a se 3 mm. remotæ simplices lineari-lanceolatae vel lineari-oblanccolatae tenuiter chartaceæ vel lanceolatae subsessiles 24-50 cm. longæ  $4\frac{1}{2}$ -6 cm. latæ apice obtusissimæ vel obtusæ basi gradatim attenuatæ ad basin ad costam attenuatæ margine subintegre vel plus minus latissime obscure undulatæ margine haud recurvæ, costa complanata ad basin in sectione lentiformi 3-4 mm. lata supra tenuiter elevata sed valde complanata late canaliculata medio 1 mm. lata subtus elevata minus complanata sed plus minus convexa, venis lateralibus primariis utroque latere costæ circ. 30, mediis a costa angulo 60° egressis subrectis in exsiccatō utroque latere tenuiter elevatis visis, reticulis venularum supra minus subtus plus elevatis supra vix vel haud, subtus distincte visis, sub luce transversa distincte visis, areolis reticulorum venulas liberas simplices vel furcatas includentibus. Pagina supra glabra subtus prope costam squamis minutis sparsissime conspersa, squamis fusco-nigricantibus caudato-ovatis 1 mm. longis  $\frac{1}{2}$  mm. latis apice caudato-acuminatis basi rotundatis profunde cordatis, lobis cordis valde imbricatis, margine setuloso-serrulatis. Sori minuti  $\frac{1}{2}$ -1 mm. in diametro numerosissimi medio frondis usque ad apicem aequaliter dispersi.

HAB. Akōchō: Daitetsu, leg. T. SŌMA, Juli. 1912.

Near *Polypodium irioides* LAM(= *P. punctatum*), but separable from it in having nearly sessile fronds of much thinner texture.

**Polypodium Blumeanum** C. CH. (Fig. 124 A-B) Ind. p. 60.

*Gymnogramme avenia* BAKER Syn. Fil. p. 388.

*Antrophyum avenium* BLUME Fl. Jav. Fil. t. 37, f. 1.

*Antrophyum coriaceum* BLUME Fl. Jav. Fil. t. 37, f. 2.

Rhizoma horizontaliter repens 4 mm. crassum apice haud ascendens infra dense radicans supra cicatricibus frondum 2-seriatim dense dispositis notatum vel sursum dense frondigerum, frondibus 2-seriatim dense dispositis; rhizoma apice squamis dense obtectum. Stipes ad basin insertionis dense squamatus, squamis oblongis tenuissimis castaneis vel stramineis apice rotundatis basi contractis integris 6-7 mm. longis. Frons tenuiter chartacea vel crasso-membranacea

oblanceolata vel obspathulata 12 cm.-30 cm. longa 13 mm.-30 mm. lata apice longe caulato-acuminata (acuminibus linearibus vel angustatis) basi gradatim longissime attenuata ad basin 3 mm. abeunt subsessilis margine subintegra vel minute irregulariter denticulato-crenulata angustissime cartilagineo-marginata, costa in exsiccatō distincte elevata pallido-straminea  $\frac{2}{3}$  mm. lata complanata ad basin plus minus purpurascēti subtus haud elevata haud distincta, pagina utraque glabra supra atro-viridis subtus pallidissima, venis in luce transversa distincte visis reticulatis, reticulis elongato-hexagonis ascendente dispositis.

HAB. Mt.

Arisan: Niman-  
daira, Aprili.

1914, leg. B.

HAYATA et TA-  
KEO ITÔ.



Fig. 124-A,  
*Polypodium Blume-  
anum* C. Chr.; a,  
a portion of the  
frond; b, a portion  
of a scale at the  
base of the stipe,  
showing the cellu-  
lar structure.



Fig. 124-B; *Polypodium Blumeanum* C. Chr.  $\times \frac{1}{3}$ .

Fig. 123-A; *Polypodium* sp.

**Polypodium** sp. (Fig. 125 A-B) Rhizoma ad truncos arboris cre-scens repens teres  $3\frac{1}{2}$  mm. in dia-metro dense adpresse squamatum supra alternatim approximatum frondigerum subtus radiciferum, radicibus fibrosis pilis dense obtec-

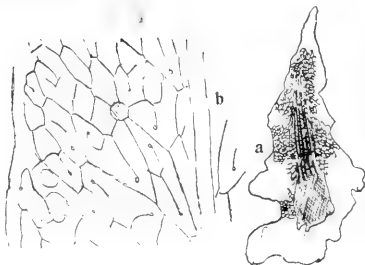
Near *Loxogramme involuta* PRESL. (BEDD. Fern. South Ind. t. 50 = *Polypodium scolopendri-num* CHRIST Farnk. Erdl. p. 107, fig. 302), but dif-fers from it by the much thinner fronds with erose margin.

**Polypodium con-tiguum** SMITH. "HOO-KER'S JOURN. Bot. III. p. 391 (1841)"

*Lecanopteris formo-sana* HAYATA in Tōkyō Bot. Mag. XXVI. p. 111.

HAB. Mt. Arisan, leg. TAKEO ITŌ et B. HAYATA, Mart. 1914.

Compared with a specimen from the Phi-lippines in the Herba-rium at Tōkyō.

Fig. 125-B, *Polypodium* sp.; a, a scale on the rhizome; b, a portion of the frond.

tis, pulvinis stipitum usque ad 2 mm. altis elevatis squamis dense obtectis; squamis rhizomatis ovato-lanceolatis  $2\frac{1}{2}$  mm. longis 1 mm. latis apice acutis basi rotundatis peltatis basi partibus peltatis margine lobatis cæterum eroso-integris. Stipes 8 cm. longus subteres plus minus dorso complanatus glaber nitidus castaneo-stramineus. Frons longissime lanceolato-linearis 40 cm. longa stipitem in longitudine 5-plo superans 2 cm. lata infra medium latissima sursum longissime attenuata acuminatissima ad acumen lineare 2 mm. latum abeuns ad summum acuta basi gradatim cuneato-attenuata margine subintegra vel obscure undulata ad marginem subplana, costa medio supra elevata  $\frac{2}{3}$  mm. lata subtus minus elevata; textura in exsiccato coriacea in vivo tenuiter coriacea, pagina haud nitida supra pallido-viridis subtus pallidior in exsiccato fuscens supra glabra subtus subglabra, venis venulis sub luce transversa anastomosantibus reticulatis. Sori a infra medium frondis usque ad infra acumen utroque latere costæ 1-seriatim dispositi oblongi longiores quam latiores 4 mm. longi  $2\frac{1}{2}$  mm. lati, pagina supra ad receptaculum sori impressa, partibus impressis ellipticis vel linearibus 3 mm. longis 1 mm. latis; reticulis venularum utraque pagine tenuissime elevatis.

HAB. Mt. Arisan, leg. TAKEO ITÔ et B. HAYATA, Mart. 1914.

Whether this species is identical with *P. obscure-venulosum* or not demands further investigation.

**Polypodium ensatum** THUNB.; HOOKER et BAKER Syn. Fil. p. 361.

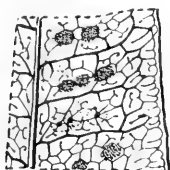
HAB. Arisan: Nimandaira, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

This fern, though common in Japan, is very limited in Formosa. It is found only in some high elevations and is rather rare. The Formosan form has much larger fronds and longer stipes.

**Polypodium ensato-sessilifrons** HAYATA sp. nov. (Fig. 126-A-B). Rhizoma repens subcomplanatum in exsiccato fusco-nigricans apice dense squamatum, squamis rubro-castaneis fuscentibus caudato-ovatis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis haud cordatis haud peltatis margine erosis vel subintegris. Stipes brevissimus  $\frac{1}{2}$ -1 cm. longus supra canaliculatus subtus convexus. Frons subsessilis oblanceolata apice acuminata supra medium latissima infra medium angustata deorsum gradatim attenuata gradatim ad basin decurrens, partibus inferioribus minus quam  $1\frac{1}{2}$  cm. latis 5-10 cm. longis, margine plana subintegra vel repanda, textura membranaceo-chartacea in exsiccato pellucida supra castanea subtus



pallido-castanea utraque pagine glabra, costa straminea supra tenuiter elevata canaliculata vel sulcata vel haud sulcata subtus prominente elevata convexa, venis lateralibus primariis supra vix subtus prominente elevatis gracilibus a costa angulo recto vel obtusissimo egressis subrectis vel flexuosis supra cum venulis fusco-coloratis reticulatis utraque pagine distincte visis, sub luce transversa distinctissime visis, areolis reticularum venulas liberas furcatas vel simplices includentibus; pagina subtus medio sursum usque ad basin acuminis sori-fera. Sori rotundati majores vel late rotundati 3 mm. in diametro distincti vel interdum se confluentes utroque latere inter venas laterales 1-3 secus



a



b

Fig. 126-A; *Polypodium ensato-sessilifrons* HAYATA; a, a portion of the frond; b, a scale on the rhizome.



Fig. 126-B; *Polypodium ensato-sessilifrons* HAYATA  $\times \frac{1}{3}$ .

venas 1-seriatim dispositi costa plus approximati quam margine.

*Polypodium ensatum* HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 630 (non THUNB.).

HAB. Shintiku: Mt. Goshizan, leg. U. MORI, Jan. 1907, (No. 5111).

Near *Polypodium hemionitideum* WALL. (BAKER Syn. Fil. p. 360. = *Pleopeltis hemionitidea* WALL. BEDD. Fern. South Ind. t. 172) in the very short stipes and semi-transparent membranaceous fronds with very prominent costules and veins, but differs from it by the fronds with a suddenly tapering base.

***Polypodium hypochrysum* HAYATA**

sp. nov. (Fig. 127-A-B).

Epiphytica? Rhizoma repens subteres 3-4 mm. in diametro subviride dense squamatum, squamis fulvo-castaneis caudato-rotundatis  $2\frac{1}{2}$  mm. longis  $1\frac{1}{2}$  mm. latis apice caudatis (caudis  $1\frac{1}{2}$  mm. longis) basi rotundatis profunde cordatis, lobis cordis valde imbricatis, margine crosis, pulvinis stipitum elevatis. Stipes ad basin dense squamatus a basi sursum subglaber vel sparsissime squamatus stramineus dorso complanatus cum fronde



Fig. 127-A; *Polypodium hypochrysum* HAYATA.

æquilongus vel longior vel brevior 15 cm. longus 1 mm. latus supra deorsum sulcatus sursum ad medium costulatus subtus convexus. Frons lanceolata circ. 15 cm. longa infra medium latissima 2 cm. lata apice gradatim angustata ad apicem acuta basi abrupte cuneata ad stipitem decurrens margine subplana vel sursum recurva integra vel undulata; textura coriacea supra atro-viridis subtus flavo-virido-pallidissima supra glabra subtus squamis sparse conspersa, costis supra perfecte planis complanatis haud elevatis haud impressis subtus tenuiter elevatis convexus. Frons supra subglabra subtus prope costam sparse squamis minute conspersa, squamis ovato-lanceolatis  $1\frac{1}{2}$  mm. longis  $\frac{1}{2}$  mm. latis apice acuminatis basi rotundatis peltatis; frons partibus inferioribus exceptis subtus toto sorifera. Sori utroque latere costæ 1-seriatim dispositi a costa plus quam a margine distantes rotundati vel elliptici, linea media per soros oblongos a costa angulo  $45^\circ$  egressa. Paraphysis rotundato-polygona  $\frac{2}{3}$  mm. in diametro peltata. Spora flava nitidissima.

HAB. Giran: Suō, leg. T. KAWAKAMI et S. FUJII, Feb. 1914.

**Polypodium infra-planicostale** HAYATA sp. nov. (Fig. 128-A-B). Epiphytica; rhizoma repens 2 mm. in diametro dense frondigerum in exsiccato fuscens densiuscule squamatum, squamis demum solutis fuscantibus caudato-rotundatis 3 mm. longis  $1-1\frac{1}{2}$  mm. latis apice caudatis, partibus caudatis  $2\frac{1}{2}$  mm. longis subulato-acuminatis, partibus basis rotundatis 1 mm. longis  $1\frac{1}{2}$  mm. latis basi profunde cordatis, lobis cordis valde se imbricatis, margine erosis, partibus mediis fusco-castaneo coloratis, partibus marginalibus hyalinis. Stipes subnullus vel 5 mm.—20 mm. longus glaber subteres supra subplanus subtus convexus supra costatus in sectione lentiformis sursum subalatus basi haud alatus circ. 2 mm. latus supra costatus, costa circ.  $\frac{1}{3}$  mm. lata. Frons lineari-lanceolata

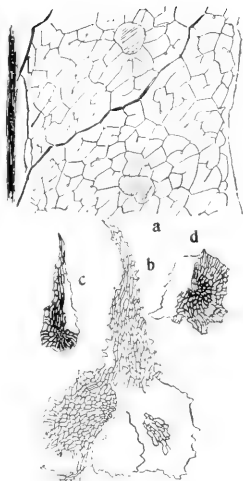


Fig. 127-B, *Polypodium hypochrysum* HAYATA; a, a portion of the frond; b, a scale on the rhizome; c, a scale on the frond; d, a paraphysis.

10-30 cm. longa 12-22 mm. lata apice acuminatissima basi gradatim ad stipitem abeunt margine subintegra vel crosa: textura chartacea vel tenuiter coriacea. costa in exsiccato supra tenuiter elevata deorsum circ.  $\frac{1}{2}$  mm. lata subtus in exsiccato elevata sed in vivo plana haud elevata inferi-



Fig. 128-A; *Polypodium infra-planicostale* HAYATA  $\times \frac{1}{2}$ .

ore  $1\frac{1}{3}$  mm. lata, venis venulis utraque pagine tenuissime elevatis vix visis sub luce transversa distincte visis, areolis reticulorum venulas liberas simplices vel furcatas includentibus; frons supra viridis subtus pallidissima subtus a medio vel a paullo infra medium sursum usque ad basin acuminis utroque

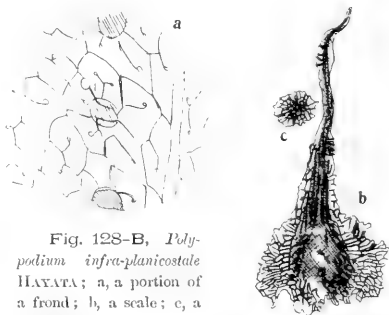


Fig. 128-B, *Polypodium infra-planicostale* HAYATA; a, a portion of a frond; b, a scale; c, a paraphysis.

latere costæ 1-seriatim sorifera, acuminibus haud soriferis. Sori costa plus approximati quam margine rotundati majores 5 mm. in diametro se modice approximati. Paraphysis rotundata peltata  $\frac{1}{4}$  mm. in diametro margine crosa medio fusco-castaneo-colorata *Polypodio annuifronde* MAKINO proxima est.

HAB. Mt. Arisan, leg. TAKEO ITÔ et B. HAYATA.

**Polypodium Kanashiroi\*** HAYATA sp. nov. (Fig. 129-A-B). Rhizoma dense radiciferum supra dense frondiferum, cicatricibus stipitum dense approximatis cupuliforme impressis minus quam 1 mm. in diametro, apice densissime squamatum, squamis fusco-nigricantibus trian-



Fig. 129-A, *Polypodium Kanashiroi* HAYATA  $\times \frac{1}{2}$ .

Fig. 129-B, *Polypodium Kanashiroi* HAYATA; a, a scale on the rhizome; b, a portion of the frond; c, apical portion of a lobe of the frond.

\* For comment as to this being referred to *Polypodium*, see the note under *Polypodium urceolare* HAYATA.

gulari-linearibus 3-4 mm. longis medio  $\frac{1}{2}$  mm. latis basi latissimis circ. 1 mm. latis apice acuminatis basi dilatatis leviter cordatis margine remote setoso-ciliolatis. Stipes brevissimus minus 5 mm. longus patento-pilosus fuscens haud squamatus densissime setuloso-hirsutus, setulis patentissimis  $\frac{1}{3}$  mm. longis. Frons longe linearis 15-23 cm. longa 15-18 mm. lata apice obtusa vel longe caudata pinnati-lobata medio usque ad rhachin 5 mm. latam lobata (sinibus mediis inter lobos triangulari-obtusis a costa 3 mm. distantibus), lobis alternis utroque latere 20-35 mediis lateralibus elongato-triangularibus rectis plus minus ascendentibus 7 mm. longis basi dilatatis  $5\frac{1}{2}$  mm. latis apice obtusissimis margine integris, lobis superioribus inferioribus subaequilongis sed sursum versus apicem gradatim minoribus ad dentem lobi terminalis abeuntibus; lobis lateralibus deorsum prope basin ad undum abeuntibus; lobo terminali elongato-lineari 3 cm. longo 5 mm. lato apice obtuso margine crenato-repando ad marginem plano deorsum plus minus dentato, lobo terminali rarius obsoleto (ibique frons apice abrupte obtusa.); frons deorsum gradatim attenuata, partibus attenuatis haud lobatis sed transverse undulatis, undis superioribus semirobundatis 5 mm. latis  $2\frac{1}{2}$  mm. longis inferioribus gradatim minoribus versus basin ad nullum reductis, partibus deorsum attenuatissimis ad stipitem minus quam 5 mm. longum abeuntibus; textura membranacea vel tenuiter chartacea, costis pinnarum mediarum a rhachi frondium angulo 45° egressis, pagina supra in exsiccatto fuscens subtus pallidior fulvescens supra subglabra subtus ad costas tenuiter hirsuta margine pilis validibus ciliiformibus instructa, costa utraque pagine elevata, venis lateralibus primariis utraque pagine tenuissime elevatis vel haud elevatis, venis haud visis sed sub luce transversa venis venulisque distincte visis simplicibus haud anastomosantibus, venulis simplicibus haud furcatis. Sori prope apicem ad paginam inferiorem lorum solitarii.

HAB. Loo-choo: leg. S. KANASHIRO, (No. 215).

Near *Prosaptia alata* (= *Prosaptia Emersoni*), but distinguishable from it in having triangular lobes of the fronds.

**Polypodium Kawakamii** HAYATA (Fig. 130-A-B) Mater. Fl. Formos. p. 447. Descriptio auctata: Rhizoma teres repens in exsiccatto fulvo-rubescens, squamis deciduis adpressis dense obtectum, squamis polygonis 1 mm. in diametro castaneis ad centrum nigris margine integris sed lobatis ad centrum peltatis.

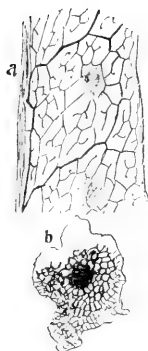


Fig. 130-A,  
*Polypodium Karakamii* HAYATA; a, a portion of the frond; b, a scale on the rhizome.

Pagina frondis supra glabra  
subtus sparsissime squamis  
minutis lepidiformibus pel-  
tiformibus rotundatis con-  
spersa vel vix glabra.

***Polypodium kusu-***  
***kusense* HAYATA** sp. nov.  
(Fig. 131-A-B). Rhizoma  
repens teres fuscens dense  
squamatum remote frondi-  
gerum et radicerum, fron-

dibus a se 1-2cm. remotis, squamis ovato-lanceolatis fuscantibus  $3\frac{1}{2}$  mm. longis  $\frac{3}{4}$  mm. latis apice acuminatissimis basi profunde cordatis, lobis cordis valde se imbricatis margine irregulariter crosis vel lobulatis. Stipes plus 1 cm. longus dorso complanatus subglaber sursum alatus gradatim ad frondem abeuns. Frons lineari-lanceolata cum partibus longe decurrentibus 25 cm. longa medio  $1\frac{1}{2}$  cm.



Fig. 130-B, *Polypodium Karakamii* HAYATA.

lata apice acuminata ad medium gradatim cuneata a medio deorsum angustissime attenuato-decurrentis, partibus decurrentibus minus quam 3 mm. latis 6 cm. longis, basi ad stipitem abeuns margine laud plana repando-crispata; textura



Fig. 131-A,  
*Polypodium kusukusense* HAYATA;  
a, a scale on the  
rhizome; b, portion  
of the frond.



Fig. 131-B, *Polypodium kusukusense* HAYATA.

chartacea utraque pagine subglabra in vivo supra atro-viridis in exsiccatto fuscens, costa utraque pagine elevata supra dorso complanata subtus convexo-elevata, venis venulis utraque pagine tenuissime elevatis, venis lateralibus pri-



mariis flexuosis, arcolis venularum venulas simplices clavatas liberas includentibus; frons subtus partibus attenuatis decurrentibus exceptis per totam paginam sorifera. Sori lineares utroque latere costae inter venas laterales primarias solitariter siti fere a costa usque ad marginem extensi, mediis a se 3 mm. remotis a costa angulo 60° egressis.

HAB. in silvis Kusukusu, leg. B. HAYATA et S. SASAKI, Juli. 1912.

Near *Polypodium Wrightii* METT., but differs from it by the very much narrower fronds of much thicker texture.

***Polypodium morrisonense***

HAYATA (Fig. 133-A-B-C) Mater. Fl. Formos. p. 447 et Ic. Pl. Formos. IV. p. 250. Descriptio auctata: Rhizoma dense adpressequ squamis obtectum, squamis caudatis rotundatis 4 mm. longis 1½ mm. latis basi ovatis peltatis margine crosis.

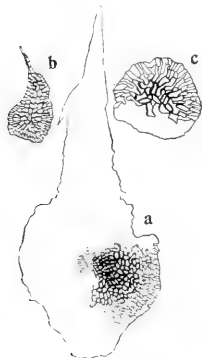


Fig. 133-A, *Polypodium morrisonense* HAYATA; a, a scale on the rhizome; b, a scale on the frond; c, a paraphysis.



Fig. 133-B, *Polypodium morrisonense* HAYATA.

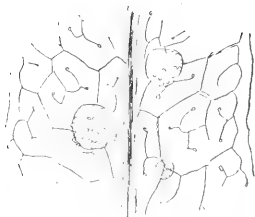


Fig. 133-C, *Polypodium morrisonense* HAYATA; a portion of the frond.

This is a species having simple entire fronds of the thinnest texture.

***Polypodium obscure-venulosum* HAYATA sp. nov.** (Fig. 134-A-B) Epiphytica. Rhizoma repens in exsiccatō fuscens teres 2-3 mm. in diametro squamis dense obtectum, pulvinis stipitum elevatis, remotiuscule frondigerum, frondibus a se 8-10 mm. remotis, squamis fusco-castaneis 4 mm. longis  $1\frac{1}{2}$  mm. latis apice caudato-acuminatis basi oblongo-rotundatis peltatis, partibus infra insertionem  $1\frac{1}{3}$  mm. longis crosso-lobulatis vel subintegris medio castaneo-coloratis prope marginem hyalinis haud coloratis. Stipes glaber subteres vel leviter complanatus 6-7 cm. longus 1 mm. in diametro castaneo-stramineus. Frons simplex lan-

Pagina supra glabra subtus prope costam squamis minutis sparsissime dispersa, squamis caudato-rotundatis peltatis  $\frac{2}{3}$  mm. longis margine crosis. Paraphysis rotundata subintegra peltata  $\frac{1}{2}$ - $\frac{2}{3}$  mm. in diametro.



Fig. 134-A, *Polypodium obscure-venulosum* HAYATA  $\times \frac{4}{1}$ .

ceolata 27-30 cm. longa supra basin ad 6-7 cm. altitudinem latissima  $2\frac{1}{2}$  cm. lata apice gradatim attenuata acuminatissima, acuminibus longissime linearibus minus quam 2 mm. latis  $2\frac{1}{2}$  cm. longis, basi attenuatocuncata margine undulato-crispata subintegra

margine haud plana undulata; textura chartacea, pagina subtus pallida supra glabra subtus prope costam squamis sparsissime conspersa vel haud squamata glabra, costa supra elevata dorso complanata ad apicem frondis attingenti subtus deorsum tenuissime elevata complanata vel tenuiter sulcata sursum gradatim plana haud elevata haud impressa. Sori a medio vel supra medium frondis usque ad basin acuminis utroque latere costæ 1-seriatim siti se subapproximati vel a se 3 mm. remoti rotundati 3-4 mm. in diametro; sori costa plus approximati quam margine.

HAB. Taichû: Kashigatani, leg. G. NAKAHARA, Feb. 1907, (No. 5926); Mt. Arisan, leg. TAKEO ITÔ et B. HAYATA, April. 1914.

***Polypodium remote-frondigerum* HAYATA** sp. nov. (Fig. 135-A-B).

*Loxogramme remote-frondigerum* HAYATA. Rhizoma horizontaliter repens teres 1 mm. in diametro remote frondigerum, frondibus 1-3 cm. a se remotis, usque ad pulvinum sub stipitibus squamatum, squamis tenuibus late oblongis fusco-castaneis apice acuminatis basi haud cordatis 2-3 mm. longis  $1\frac{1}{2}$  mm. latis margine integris. Stipes haud squamatus sed deorsum brevissime sub microscopio pilosus, pilis brevissimis. Frons coriacea utraque pagine glabra longissime linearia. 20-35 cm. longa 7-6 mm. lata apice longe linearis acuminatissima ad summum haud obtusa plus minus ~-formiter recurva basi longe attenuata ad stipitem 3-4 cm. longum abeuns margine integra in exsiccato sursum recurva plus minus ~-formiter recurva, costa dorso complanata medio 1 mm. lata supra plus elevata, partibus elevatis planis subtus vix vel haud elevatis; pagina

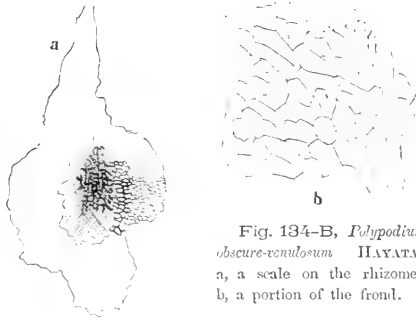


Fig. 134-B, *Polypodium obscure-venulosum* HAYATA; a, a scale on the rhizome; b, a portion of the frond.

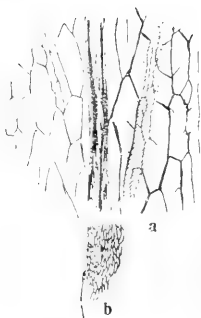


Fig. 135-A, *Polypodium remote-frondigerum* HAYATA; a, portion of the frond; b, portion of a scale on the rhizome, showing cellular structure.

crasso-coriacea in vivo atro-viridis subtus pallidissima; frons a medio sursum usque ad basin acuminis subtus sorifera. Sori lineares circ. 1 cm. longi 2 mm. lati recti inter costas et margines utroque latere costæ 1-seriatim siti, receptaculis supra haud impressis.

HAB. Mt. Arisan, inter Fun-kiko et Taroyen, leg. TAKEO ITÔ et B. HAYATA, Mart. 1914.

Very near *Gymnogramme lanceolata* Hk. BAKER Syn. Fil. p. 387, (= *Loxogramme lanceolata* PRESL. in BEDD. Fer. South Ind. t. 51. = *Polypodium loxogramme* Mett. = *Graminitis lanceolata* Hk. et Gr. t. 43); but differs from it by the larger reticula of the veinlets.

***Polypodium urceolare* HAYATA sp. nov.** (Fig. 136 et 137, a-f). Epiphytica ad truncos crescens. Rhizoma breve frondes cespitosum gerens dense squama-



Fig. 135-B, *Polypodium remote-frondigerum* HAYATA  $\times \frac{3}{4}$ .

tum, squamis lanceolatis fuscentibus facie margineque hispidis. Stipes 1-2 cm. longus gracillimus patentissime hispidus fuscens, pilis fuscentibus. Frons linearis 12-30 cm. longa  $1\frac{1}{2}$ - $2\frac{1}{2}$  cm. lata apice gradatim angustata ad summum acuminato-vel plus generaliter triangulari-obtusa basi gradatim attenuata ad stipitem abeuns circ. ad rhachin pinatifida, segmentis alternis linearibus 9-15 mm. longis 3-4 mm. latis apice truncatis vel obtusissimis basi dilatatis utroque latere parallelis margine se approximatis vel a se 4 mm. remotis; segmentis partibus inferioris frondis attenuatæ late triangularibus latis-  
 simis brevissimis deorsum ad undulam reductis plus quam 5 mm. latis, segmentis superioribus versus apicem frondis valde minoribus ad id  $1\frac{1}{2}$  mm. latum totiusque longum reductis; sinibus inter segmenta media obtusis; pagina chartacea supra minus subtus plus hispida in exsiccato supra fusco-viridis subtus pallido-flavescens; rhachis frondis medio 3 mm. lata, costa supra haud vel vix elevata subtus tenuiter elevata, venis venulis supra vix impressis subtus haud impressis haud elevatis haud visis, venis segmentorum a rhachi frondis angulo 50° egressis. Sori prope marginem et prope apicem segmentorum siti, sed haud



Fig. 136. *Polypodium urceolare* HAYATA.

flavescens; rhachis frondis medio 3 mm. lata, costa supra haud vel vix elevata subtus tenuiter elevata, venis venulis supra vix impressis subtus haud impressis haud elevatis haud visis, venis segmentorum a rhachi frondis angulo 50° egressis. Sori prope marginem et prope apicem segmentorum siti, sed haud

ad marginem, haud ad apicem siti, sub segmento singulo 1-8 valde immersi; cavis sororum ascendentibus 1 mm. longis, ore elevato  $\frac{2}{3}$  mm. in diametro, circum oria hispidis.

HAB. Mt. Arisan, prope Senninbora, leg. TAKEO ITÔ, Aprili. 1914.

This new fern and *Polypodium Kanashiroi* HAYATA are species belonging to *Prosaptia* which is, according to the leading pteridologists, regarded to be a subgenus of *Davallia*. Yet, quite contrary to the current opinion, I have here taken the ferns as species of *Polypodium*. This requires a full explanation.

*Prosaptia* is a genus which was established by PRESL,<sup>1)</sup> as early as 1836, on the species *Prosaptia contigua*, which was then found in the Philippines. It is, as has been remarked by several authors, a fern closely resembling *Polypodium obliquatum* in its external features, especially in its rhizomes, scales, hairy stipes and fronds, with much the same kind of division and venation. But it has been regarded by several leading pteridologists as widely different from *Polypodium* in its fructification. It is, therefore, often referred to as representing a class of ferns which, though closely alike externally, should be treated as quite different systematically.<sup>2)</sup> The genus under consideration is assigned to the vittariæ by the founder, as it has a sorus located at the margin of the frond as is the case with *Vittaria*. FÉE<sup>3)</sup> in his classical "Exposition des Fougères" expresses his opinion about the natural position of the genus and says that it might be better placed in the Davalliæ, as it has a sorus somewhat resembling that of *Davallia*. Later on, SMITH<sup>4)</sup> reduces the genus to *Polypodium* on the ground that it bears so close a relation to the latter genus that it should be regarded as inseparable. COPELAND<sup>5)</sup> retains *Prosaptia* in the sense that the generic definition is to some extent admissible, so far as it is convenient for systematizers, and he finally concludes that *Prosaptia* is a good genus quite clearly defined from *Polypodium*, although he admits that SMITH does not violate the natural system in reducing the former

1) PRESL, C. B.—Tentamen Pteridographiæ, (1836) p. 165.

2) DIELS, L.—Pteridophyta, in ENGLER u. PRANT, Nat. Pfl.-fam. I-4, p. 144.

3) FÉE, A. L. A.—Genera Filicum, Exposition des Genus de la Famille des Polypodiacées, p. 324.

4) SMITH, J. in HOOKER's Journ. Bot. IV. (1842) p. 46,—I regret to say that I could not read SMITH's paper, as it is not accessible to me.

5) COPELAND, E. B.—in Philip. Journ. Sci. Suppl. I. (1906) p. 157.

genus to the later. His opinion is, in other words, that the fern so well defined from others should be retained as a distinct genus, however close affinity it may have to *Polypodium*.

Let me here state briefly just a few lines as to what constitutes *Prosaptia*. It is a fern closely resembling *Polypodium obliquatum* in many respects especially in its vegetative organs, but having a fructification nearly similar to that of *Davallia*. Modern pteridologists, such as HOOKER<sup>1)</sup>, BAKER<sup>2)</sup>, CHRIST<sup>3)</sup>, CHRISTENSEN<sup>4)</sup> and DIELS<sup>5)</sup>, maintain that while *Prosaptia* is separable from *Polypodium*, it is quite assignable to *Davallia*, and they rank down the former to a subgenus of the latter.

My opinion regarding *Prosaptia* is quite different from the general view of the leading authors, and is rather inclined to the statement of SMITH, who regards it as referable to *Polypodium*. For convenience sake, I shall here state my conclusion, before I go into details as to my reasons therefor. My opinion is that *Prosaptia* bears too close affinity to *Polypodium* to permit its separation from the latter genus, and that it differs from *Davallia* so widely that to assign it to the latter would at once entirely violate what we call the natural system. In other words, *Prosaptia* is really a *Polypodium* and only imitates *Davallia*. It is a fern nearly the same as *Polypodium* in its phylogeny; but it is absolutely different from *Davallia* in its derivation.

The present question as to the natural position of *Prosaptia* has arisen in my mind, since my discovery in Formosa of the present new fern, *Polypodium urceolare* HAYATA (Fig 136 and 137, a-f), which very closely resembles *Prosaptia contigua* in every respect, but has a fructification tending more toward *Polypodium obliquatum* than toward the *Prosaptia*. This led me to examine the new plant more closely in its vegetative and propagative organs. The sori are under the margin of the frond, have orifices which open obliquely on the under surface, and are margined with elevated ridges beset with bristles. Thus they are of a form just intermediate between *Prosaptia contigua* and *Polypodium obliquatum*. The gap in respect of generic characters of the two genera as retained by COPELAND, is practically filled by the presence of this new fern.

1) HOOKER, W. J.—Species Filicum I. p. 160.

2) BAKER, J. G.—Synopsis Filicum p. 94.

3) CHRIST, D.—Farnkräuter der Erde, p. 305.

4) CHRISTENSEN, C.—Index Filicum, p. 589.

5) DIELS, L.—l.c. p. 212.

The resemblance of this fern or *Prosaptia contigua* and species of the subgenus *Cryptosorus*, to which *Polypodium obliquatum* belongs, is very remarkable, and of a kind which no botanists ever dispute. The habit and shape of fronds, and the structure of hairs, scales and rhizomes are all the same. The hairs (Fig. 137-b) are very peculiar; they consist of several elongated cells arranged in a single row with very thick brownish walls. The scales are also very remarkable, being composed of polygonal cells with rather thick brownish walls arranged

in one layer, and beset with bristles on the outer surface (Fig. 137-a).

*Prosaptia*, as stated above, closely resembles *Polypodium decrescens*.

The scales of the latter differ from those of the former only in lacking bristles. These affinities in their anatomy all point to their being congeneric, as

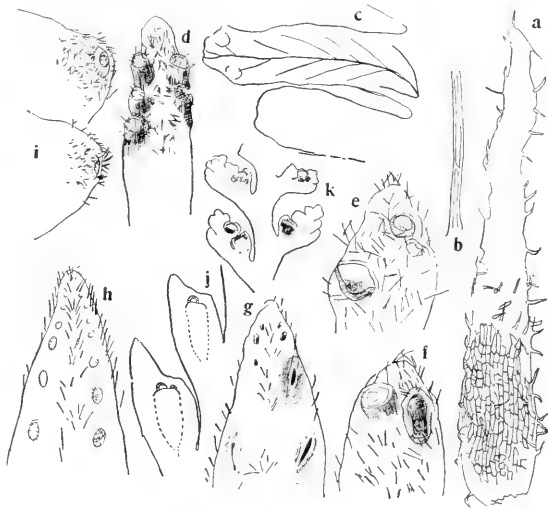


Fig. 137. a-f, *Polypodium urceolare* HAYATA; a, a scale of rhizome; b, basal portion of a hair on the stipe; c, portion of a frond, showing the venation; d, portion of a pinna, seen from below, showing the sori of the type; e, an earlier stage of the sorus-development; f, much more advanced sori, part of involucre taken off, showing the receptacles; g, an earlier stage of the sorus development of *Polypodium obliquatum*; h, nearly the same stage in *Prosaptia cecibicum* BLUME; i, nearly the same stage in *Prosaptia Emersoni*; j, full grown sori of *Davallia bullata*; k, very earlier stage of the sorus-development in the same species, showing the sori of the *Humata*-type.

such a general agreement in character is one of the most important points in the classification of genera, as is shown by C. CHRISTENSEN, and others. The anatomical characters seen in the structure of hairs and scales are mostly



hereditary<sup>1)</sup> rather than posterior, and are subject to the least change in the course of the phylogenical development of species. It is, therefore, one of the most reliable characters for the determination of the kinship of genera.

Let me now briefly state how far *Prosaptia* agrees with *Davallia* in respect of its vegetative organs. The rhizomes of the latter are long-creeping with remotely arranged fronds, while those of the former are short-creeping with densely arranged fronds. The scales of *Davallia* are composed of cells with very thin reddish walls arranged in one layer with no trace of bristles, and are totally different from what we have observed in *Prosaptia* or *Polypodium obliquatum*. The hairy stipes so peculiar to the latter two have never been found in *Davallia*. So far as the vegetative organs are concerned, *Prosaptia* is not congeneric with *Davallia*.

Now let me consider more precisely a comparison of the same ferns in respect of their fructification. My opinion is that the fructification of *Prosaptia* is altogether the same as that of *Polypodium* in its origin, but totally different from that of *Davallia* in its beginning, as I shall show later on. Before I go into details, I must pause to consider what the fructification of *Polypodium obliquatum* or of its allied species is like. In the full grown form, the sori (Fig. 137, g) of this fern look very different from the ordinary sori of a normal *Polypodium*. Therefore, it was regarded by FÉE as representing the special genus, *Cryptosorus*<sup>2)</sup>. The sorus is located in a pouch-like cavity immersed in the tissue of the fronds on the under surface, which cavity has an orifice beset with bristles. According to the author, the sori develop in the following manner: they are in the beginning formed under the epidermis ("cuticle") from which, when fully developed, at length break out; the slits in the epidermis are the orifices of the pouch-like cavities. In order to assure myself of what is stated by FÉE, I looked in my very rich collections of the same fern, and was so fortunate as to find that the fern is of a nature of indefinite growth, representing several stages of the sorus-development in one and the same frond. On the basal portions of the frond, I found full-grown

- 
- (1) { CHRISTENSEN, C.—On the natural classification of the species of *Dryopteris*, p. 75.  
 { SOLEREDER, H.—Systematische Anatomie der Dikotyledonen, p. 937.
- (2) FÉE, A.L.A.—l.c. p. 231.

sori and in the upper portions half-grown ones, while in the uppermost portions of the same frond there appeared the very beginning of sorus-formation. In the beginning, the sorus (Fig. 137-g) looks like a mere depression of the surface; this depression grows larger and deeper and becomes cup-shaped; sporangia then first appear at the center of the cup. The depression grows still deeper and larger, but the opening becomes narrower and narrower, and at length the depression sinks down into the tissue forming a pouch-like cavity with a linear orifice beset with bristles. In my specimens the orifice, quite contrary to Fée's statement, is present at the very beginning of the sorus-formation, but is not at all a slit which appears as a secondary result of the bursting of the epidermis. The sorus-formation in the earlier stages is almost the same as that of a normal *Polypodium*, but differs in having receptacles in the depression. Such a depression is, by no means, absolutely exceptional in *Polypodium*, as we see in *P. repandulum*, *P. papillosum* and others. *P. obliquatum* is simply an example of an extreme case having depressed sori. Several stages connecting this extreme form and the normal one are represented by several species of the genus just as they are represented in one series in the process of sorus-formation in one and the same frond. That *Cryptosorus* is directly derived from a normal *Polypodium* is thus clearly indicated. Consequently, there can be no doubt but that *Cryptosorus* is phylogenetically congeneric with *Polypodium*. The former is generally regarded as a subgenus of the latter by leading pteridologists, such as BAKER, CHRIST and others.

Now turning again to *Prosaptia*, I shall consider the development of the sori of *P. Emersoni* and *P. celebica*. These ferns also exhibit an indefinite growth, representing several stages of sori in one and the same frond. Full grown sori are located at the apex of the margin of the lobes with long U-form cavities with dorsally compressed orifices at the apex directed parallel to the surface of the frond, and in every respect exactly like those of *Davallia*. But, in the very beginning, the sorus-formation (Fig. 137, h-i) commences with a depression at a little below the extreme edge of the margin on the under surface, as may be seen nearly, if not exactly, in the case of *Polypodium obliquatum*. As the sorus develops, the depression grows deeper and deeper

with the edge more or less elevated; then the sporangia come into sight. When fully grown, it becomes a sorus different in appearance from that of *Cryptosorus*, but very similar to that of *Davallia*. Yet, gradually transitional forms between this *Davallia*-like sorus and the normal *Cryptosorus*-like sorus are to be found in the development of the fructification in *Prosaptia*, and also are to be seen in the full grown sorus of *Polypodium urceolare*, as I have stated before. Consequently, *Prosaptia* is in its vegetative as well as its propagative organs so closely related to *Polypodium* phylogenetically that it is quite proper to unite them into one genus.

Now let us consider whether the resemblance of *Prosaptia* and *Davallia* which seems apparently very close is really an indication of phylogenetic kinship or a mere accidental feature. To decide this question fundamentally I made the same study on *Davallia*, as I had done before on *Cryptosorus* and *Prosaptia*. *Davallia* is a fern not of indefinite, but of definite growth, and all the sori in one frond mature simultaneously. I took a young shoot of *D. bullata* nearly 5 cm. long, just coming out from the rhizome, partly coiling and partly unfolded, yet bearing beautiful sori of a very young stage. I examined the frond under a binocular microscope with object-glasses *a*<sub>2</sub> and found the sori in a stage just before sporangium-formation. Indusium-formation was just beginning a little below the apex of the lobes. The indusium (Fig. 137, k) was coming out like a broad quadrangular scale, attached at its base to the surface of the frond, but leaving its margin quite free from the latter. There was no depression whatever. The type of this kind of indusium is represented in a full grown sorus of *Humata*. It is totally different from the type seen in *Prosaptia*. It is, therefore, highly probable that *Davallia* is derived directly from *Humata*; and *Prosaptia*, from *Polypodium*. Consequently it is clear that the resemblance of *Davallia* and *Prosaptia* is a mere accidental feature. The two can never be united into one, nor should the one be treated as a subgenus of the other. One might as well take a pseudomorph for a true crystal, as to take *Prosaptia* for a *Davallia*.

After considering all the above mentioned cases, I have been led to conclude that *Prosaptia* in the first place should be taken into *Polypodium* and for convenience sake retained as a subgenus of the latter, as is the case with

*Cryptosorus*; and secondly, that *Prosaptia*, being phylogenetically quite different from *Davallia*, should be kept quite distinct from the latter genus.

***Polystichum* ROTH.**

***Polystichum aculeatum* SW. var. *variiforme* HAYATA** n. v. Pagina frondis in vivo supra nitida atroviridis subtus pallida. Stipes cum rhachibus toto squamatus, squamis lineari-lanceolatis fuscentibus; pinnulæ latiores quam cæ typicæ 21 mm. longæ 9 mm. latæ oblique oblongæ apice triangulari-acutæ basi latere superiore plus minus auriculatæ margine serrulatæ, pinnæ inferiores a se 6 cm. remotæ.

HAB. Funkiko, leg. B. HAYATA et TAKEO ITÔ, Mart. 1914.

Differs from the type by the much larger and broader pinnules and much remoter pinnæ. On the whole, this variety has a very different aspect from the type.

***Polystichum hololepis* HAYATA** sp. nov. Rhizoma ascendens apice cespitosum frondigerum dense nigro-squamatum. Stipes 20-30 cm. longus deorsum densissime nigro-squamatus sursum minute squamatus, squamis nigris linearibus subulatis integris. Frons ovata versus apicem subito angustata ad acumen abrupte abeuns 30 cm. longa 28 cm. lata apice acuminata basi in ambitu cordata bipinnata, pinnis infimis extra-ordinariter longioribus 16 cm. longis 7 cm. latis lanceolato-triangularibus pinnatis latere inferiore duplo latioribus quam latere superiore, pinnulis infimis longissimis superioribus gradatim brevioribus, pinnulis infimis lanceolatis basi latissimis 5 cm. longis 22 mm. latis pinnatifidis, segmentis lineari-oblongis apice breve aristato-acutis margine sursum aristato-serrulatis deorsum integris; pagina utraque glabra subtus ad costas sparse squamata in exsiccatō pallido-viridis utraque pagine concolor, pinnis inferioribus petiolulatis, superioribus et pinnulis sessilibus, pinnis inferioribus a se 3-4 cm. remotis a rhachi frondis angulo 45° egressis, pinnulis inferioribus a se 1 cm. remotis a rhachi pinnarum angulo 80°-90° egressis, superioribus gradatim se approximatis angulo acuto egressis; textura tenuiter coriacea vel chartacea. Sori per totam paginam prope costas vel costulas loborum utroque latere 1-seriatim siti.

HAB. Taihoku, leg. TAKEO ITÔ et S. FUJII.

Near *Polystichum varium* PRESL., but distinguishable from it by the much

more acutely toothed lobes of the pinnules; also near a form of *Polystichum aculeatum* Sw., but separable from it by the much shorter subtriangular fronds and subentire scales. The pinnæ or pinnules of this fern are very much like those of *P. aculeatum*, but the shape of fronds and scales are like those of *P. varium*. The new fern looks to be just an intermediate species of *P. aculeatum* and *P. varium*.

***Polystichum niitakayamense* HAYATA** (Fig. 137-i, et 138) Fl. Mont. Formos. p. 243, t. 41; *Polystichum stenophyllum* HAYATA Mater. Fl. Formos. p. 426 (non CHRIST). Descriptio auctata: Rhizoma ascendens apice frondes cespitosum gerens. Pagina frondis supra glabra subtus squamis lepidiformibus conspersa, squamis ovatis apice caudato-acuminatis basi peltatis rotundatis margine ciliato-dentatis  $\frac{2}{3}$  mm. longis. Indusium minutum polygono-rotundatum peltatum margine cerosum  $\frac{1}{2}$  mm. in diametro.

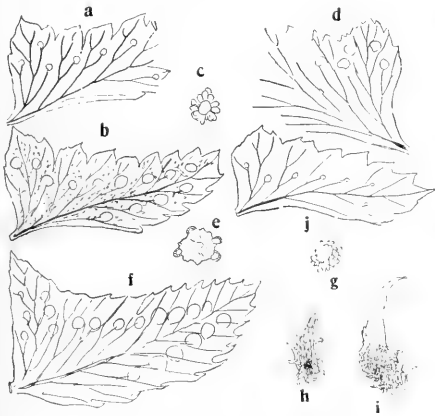


Fig. 137; a, a pinna of *Polystichum leptocaulon* HAY.; b, *Polystichum longistipes* HAY.; c, a sorus of the same species; d, *Polystichum obtuso-auriculatum* HAY.; e, a sorus of the same species; f, *Polystichum pseudo-Maximowiczii* HAY.; g, a sorus of the same species; h, a scale on the rachis of the same species; i, a scale of *Polystichum niitakayamense* HAY.; j, a pinna of *Polystichum simplicipinnum* HAY.



Fig. 138, *Polystichum niitakayamense* HAYATA  $\times \frac{1}{4}$ .

Although I reduced this fern as a synonym of *P. stenophyllum* in my former paper, I think now it better to retain *P. niitakayamense* for the present, until I shall examine a specimen of the former. As the ferns of this group are very like one another, one can not determine if they are the same or not, unless one study their characters very carefully.

***Polystichum pseudo-Maximowiczii* HAYATA (Fig. 137-f, g, h et 139)**

sp. nov. Rhizoma ascendens reliquis stipitum frondum dense obtectum apice frondes cæspitosum emittens. Stipes 13 cm. longus basi squamatus sursum glabratus basi 2 mm. latus in sectione ☺-formis supra (dorso) complanatus subtus convexus, supra medio tenuissime sulcatus utroque latere sulcorum angustissime costatus latere costæ late canaliculatus. Frondis rhachis per totam longitudinem dorso complanata in sectione lenti-formis straminea nitida subtus sparse supra plus squamata inferiore 2 mm. lata supra per totam longitudinem costata, costæ 1 mm. lata medio tenuissime sulcata castaneo-colorata per costam hirsuto-squamata. Frons linearis 40 cm. longa  $2\frac{1}{2}$ -3 cm. lata apice acuminatissima basi sensim angustata simpliciter pinnata, pinnis lineari-quadrangularibus, mediis  $1\frac{1}{2}$  cm. longis 5 mm. latis suboppositis vel alternis utroque latere 7 mm. distantibus, superioribus inferioribusque æquiformibus æquilongis, sed pinnis versus apicem et versus basin gradatim



Fig. 139, *Polystichum pseudo-Maximowiczii* HAYATA  $\times \frac{1}{2}$ .

minoribus sursum ad dentem reductis deorsum prope basin pinnam auriculiformem 6 mm. longam reductis; pinnis mediis elongato-quadrangularibus  $1\frac{1}{2}$  cm. longis basi 6 mm. latis plus minus sursum recurvis vel haud recurvis apice acutis vel obtusis ad summum brevissime cuspidatis basi obliquissimis latere inferiore basi cuneato-acutis latere superiore latissimis auriculiforme productis, auriculis triangularibus apice acutissimis apice subaristatis latere basilari interiore 6 mm. latis cum rhachibus frondum parallelis, pinnis latere inferiore —forme recurvis latere superiore —forme recurvis, margine latere inferiore sursum argute serrulatis (serrulis aristatis aristis sursum recurvatis) versus basin subintegris, pinnis totis a costa rhachis frondis oriundis; textura coriacea, pagina in vivo supra nitida viridissima subtus pallida supra glabra subtus adpresse minuteque squamata; costa pinnae utraque pagine tenuissime impressa, venis lateralibus supra vix subtus haud visis; pinnis mediis inferioribus a rhachibus frondum angulo recto egressis, pinnis inferioribus prope basin a rhachibus frondum angulo  $130^\circ$  egressis, pinnis infimis valde reflexis, pinnis superioribus a rhachibus frondum angulo  $80^\circ$  egressis; costa pinnae per pinnam diagonaliter egressa. Stipes basi dense squamatus, squamis inferioribus majoribus lineari-lanceolatis 8 mm. longis  $1\frac{1}{2}$  mm. latis apice subulato-acuminatis a medio deorsum æquilatis basi haud contractis margine ciliolato-denticulatis; pagina frondis supra subglabra haud squamata, subtus squamis uniformibus uniforme conspersa, squamis ovato-lanceolatis basi peltatis margine ciliato-dentatis apice acuminatis  $\frac{1}{2}$  mm. longis. Indusium peltatum polygono-rotundatum  $\frac{1}{2}$  mm. in diametro margine crosso-denticulatum.

HAB. Mt. Arisan, ad 7000–8000 ped. alt., leg. TAKEO ITÔ et B. HAYATA Mart. 1914.

**Polystichum subapiciflorum** HAYATA sp. nov. (Fig. 140). Rhizoma subrectum vel erecto-ascendens dense squamatum, squamis variabilissimis nunc ovato-lanceolatis nunc linearibus majoribus vel minoribus 5 mm.–20 mm. longis  $\frac{1}{2}$  mm.–5 mm. latis apice lineari-acuminatis basi leviter cordatis vel haud cordatis margine subintegris vel crosso-ciliatis. Stipes 17–18 cm. longus basi densissime squamatus supra basin minute squamato-pilosus medio  $1\frac{3}{4}$  mm. in diametro vel semi-teres supra intus profunde sulcatus sursum glabratus stramineus. Frons ovato-lanceolata 23 cm. longa 11 cm. lata apice in ambitu gradatim cau-

dato-acuminata ad summum acutissime vel breve aristata basi in ambitu truncato-obtusa pinnata, pinnis a medio inferioribus longissimis, infimis brevioribus, mediis et superioribus gradatim brevioribus versus apicem ad dentem ascendentem acuminis reductis; pinnis inferioribus longissimis 6cm. longis 2cm. latis lineari-triangularibus apice triangulari-acuminatis basi truncatis pinnatis vel pinnatifidis, pinnulis vel segmentis inferioribus majoribus, superioribus gradatim minoribus sursum ad serrulam aristatam recurvam acuminis reductis subsessilibus, inferioribus oblongo-quadrangularibus 1 cm. longis 6 mm. latis obliquis apice truncato-obtusis ad summum serrula aristata ascendento-recurva instructis margine latere superiore minus latere inferiore plus aristato-serrulatis, (serrulis ascendentibus aristatis, aristis ad latus inferi-

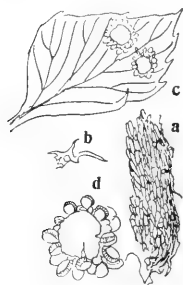


Fig. 14O, *Polystichum subapiciflorum* HAYATA; a, a portion of a scale on the rhizome; b, a scale on the ultimate veinlets of the frond; c, a pinnule; d, a sorus.



Fig. 14O, *Polystichum subapiciflorum* HAYATA  $\times \frac{1}{3}$ .



orem subito sursum recurvis ad paginam superiorem attingentibus), versus basin integris basi inæqualibus latere inferiore acuto-cuneatis latere superiore plus minus auriculiforme productis ad basin rotundato-truncatis, petiolis pinnarum inferiorum 1-2 mm. longis, petiolulis pinnularum inferiorum 1 mm. longis. Rhachis frondis dense piloso-squamata medio 1 mm. lata supra profunde canaliculata; rhachis pinnarum subtus laxè piloso-squamata supra glabra dorso complanata minus quam 1 mm. lata subalata supra tenuiter sulcata, costa pinnularum vel segmentorum supra haud impressa haud elevata, subtus tenuiter elevata; venis primariis simplicibus vel supra basin furcato-2-ramosis, ramis parallelis simplicibus ad marginem attingentibus; textura coriacea, pagina supra in vivo atroviridis subtus pallidior subglabra vel subtus prope basin minute squamata; rhachis pinnarum inferiorum a rhachibus frondis angulo 70° egressa, pinnis infimis plus minus reflexis angulo 140° egressis, pinnis subrectis vel plus minus recurvis; costa pinnularum a rhachibus pinnarum angulo circ. 60° egressa, pinnulis a se approximatis interdum leviter imbricatis, pagina frondis supra glabra subtus ad costas venas venulasque minute squamata, squamis ad venulas ultimas linearibus vermiformibus 1 mm. longis. Indusium rotundatum peltatum rarius cordatum margine crosu. Spora nigra.

HAB. Mt. Arisan: Hasegawakei, leg. TAKEO ITÔ et B. HAYATA, Aprili. 1914.

Somewhat resembles *Polystichum amabile* SM. in having sori locating near the margin, but differs from it in having undivided lowest pinnae and in the superior pinnae which are gradually passing to the lobes of the apical portion of the fronds. Remarkable for the sori which are located only toward the apex of the pinnae and pinnules.

***Polystichum obtuso-auriculatum*** HAYATA sp. nov. (Fig. 144 et 137-e, f) Rhizoma erecto-ascendens apice caespitosum frondigerum. Stipes 10-16 cm. longus basi dense squamatus sursum glabratus medio  $\frac{2}{3}$  mm. latus pallido-stramineus vel castaneus basi triqueter supra planus subtus convexus sursum latere supra profunde sulcatus compressus sursum sparse minute squamatus. Frons lanceolata 22-33 cm. longa stipitem duplo superans 4-5 cm. lata apice acuminata basi truncata partibus superioribus exceptis æquilata apice acuminatissima pinnata, sed in acumine pinnatifida pinnatiloba vel dentata, partibus pinnatifidis minus quam 3 cm. longis minus quam 1 cm. latis versus apicem

remote - dentatis, pinnis inferioribus  $2\frac{1}{2}$ - $3\frac{1}{3}$  cm. longis 8-10 mm. latis falcato-lunato-linearibus subrectis vel plus minus falcatim recurvis apice acutis basi latere inferiore anguste cuneatis latere superiore late auriculato-truncatis margine irregulariter serrulatis, (serrulis aristato-acutis), partibus basilaribus integris, auriculis obtusis rotundatis versus apicem serrulatis; textura chartacea vel tenuissime coriacea, pagina utraque glabrata subtus per totam paginam sorifera. Sori margine frondis quam costula plus approximati.



Fig. 144, *Polystichum obtuso-auriculatum* HAYATA  $\times \frac{2}{3}$ .

riacea, pagina utraque glabrata subtus per totam paginam sorifera. Sori margine frondis quam costula plus approximati.

HAB. Mt. Arisan, inter Karapin et Funkiko, leg. TAKEO ITÔ, Mart. 1914.


Near *Polystichum auriculatum* PRESL. (BEDD. Fern. South Ind. p. 41, t. 120 = *Aspidium auriculatum* SW.; HOOKER et BAKER Syn. Fil. p. 251), but dis-

tinguishable from it by the less scaly rhachis and much obtuser auricles of the pinnae.

#### Group of *Polystichum tripterum* Pr.

Species belonging to this group having simply pinnate fronds with pinnate lowest pinnae, which are longer than the others and are arranged horizontally, were previously two in all; one is the Japanese species, *P. tripterum* Pr. and the other, the Formosan, *P. Hancockii* Diels. In my last excursion to Formosa, I paid special attention to this group of ferns and found several new species which are very similar in appearance yet separable in details. Of all the species, *P. tripterum* Pr. is the most easily distinguishable from the others in having narrowest pinnae with by far the sharpest teeth, in the thinnest texture and in the cellular structure of the scales. *Polystichum longistipes* Hayata and *P. Hancockii* Diels are separable from the other species by the very long stipes which nearly equal the fronds in length. *P. simplicipinnum* Hayata and *P. yueyamense* Makino differ from the others by the lowest pinnae which are nearly the same as the other pinnae or slightly longer and scarcely pinnate. As can be considered from the following key, the distinction between each two of the species can not be very clearly given in verbal expression and the difference itself is really very small, so that even to accurate observers it would be difficult to recognize the species proposed by me. I myself am pretty sure that many botanists will be apt to render my species to varieties of the oldest species *Polystichum tripterum* Pr. As it is a very difficult task and depends to a greater extent upon personal opinions, to decide whether they should stand each distinct or should be regarded as varieties of some one species, I shall at present leave the question entirely to the readers.

#### Key to the species of the group represented by *Polystichum tripterum* Pr.

- A. The lowest pinnae are very much longer than the others and are usually once more pinnate.
  - a. Fronds much longer than the stipes.
    - α. pinnae more than 2 cm. long, more or less recurved after -form, more sharply toothed. *Polystichum tripterum* Pr.

- β. Pinnæ less than 2 cm. long, nearly straight, more or less ascending, less sharply toothed. *P. leptopteron* HAYATA.
- b. Fronds nearly equaling the stipes in length.
- α. Sori locating nearer the costula than the margin; scales nearly fimbriate at the base, usually subentire. *P. longistipes* HAYATA.
- β. Sori locating nearer the margin than the costa; scales setaceous. *P. Hancockii* DIELS.
- B. The lowest pinnæ are nearly the same as the others, and usually obscurely pinnate.
- α. Pinnæ not exceeding 1 cm. in length, usually ascending; lower margin of the pinnæ divaricating from the rhachis of the fronds at the angle 45°. *P. yueyamense* MAKINO.
- β. Pinnæ exceeding 1 cm. in length, usually nearly horizontal; lower margin of the pinnæ divaricating from the rhachis of the fronds at angles 70°-90°. *P. simplicipinnum* HAYATA.

**Polystichum Hancockii** DIELS in ENGL. u. PRANTL Nat. Pfl.-fam. Pterid. p. 191; *Ptilopteris Hancockii* HANCE in Journ. Bot. XXII. p. 139:—"Cæspitosa, foliis tenuiter coriaceis in sicco olivaceis glaberrimis petiolo 8-pollicari sordide stramineo paleis paucis setaceis pallidis hinc inde tecto, lamina 8-pollicari lanceolata acuminata præter segmentum utrumque infimum 2½ pollicare iterum pinnatisectum simpliciter pinnatisecta segmentis numerosis approximatis patenti-divergentibus 5-9 lin. longis 2 lin. latis breviter petiolatis e basi inferiore dimidiato-cuneata apicem versus tantum dentata superiore auriculata trapezio-ovata ovato-lobulata lobulis setaceo-mucronatis postico nunc subdistincto nervis semel furcatis, soris ad rami antici apicem sitis margini potius quam costulæ excentricæ approximatis. In dorso montium juxta Tam-sui, Ins. Formosæ, alt. 3500 ped., d. 11. Dec. 1881, rarissimam invenit am W. HANCOCK. (Herb. propr. n. 22229)."

**Polystichum leptopteron** HAYATA sp. nov. (Fig. 141 et 137-a). Rhizoma ascendens apice cæspitosum frondigerum. Stipes 10 cm. longus. Frons 20 cm. longa cruciforme trifoliolata, pinna terminali lineari-lanceolata apice caudato-acuminata basi truncata pinnata, pinnulis lineari-quadrangularibus mediis 1½ cm.

longis 5 mm. latis basi latere superiore auriculatis margine serrulatis, pinnis infimis oppositis 5 cm. longis linearibus pinnatis, pinnulis minoribus.

HAB. Shintika: Kareizan, leg. U. MORI, Juli. 1906, (No. 1400).



Fig. 141, *Polystichum leptopterum* HAYATA.

Differs from *Polystichum Hancockii* DIELS by the relatively short stipes which are half as long as the fronds.

**Polystichum longistipes** HAYATA, sp. nov. (Fig. 142, 137-b, c). Rhizoma ascendens apice caespitosum frondigerum. Stipes 18-25 cm. longus. Frons sti-

pitum in longitudine æquans vel brevior cruciforme 3-foliolata; foliolo terminali lineari-lanceolato 20 cm. longo  $2\frac{1}{2}$ –3 cm. lato pinnato, pinnis mediis lineari-quadrangularibus 13 mm. longis 6 mm. latis basi latere superiore auriculatis margine serrulatis; foliolis lateralibus duobus oppositis 5 cm. longis pinnatis, pinnulis minoribus.

HAB. in monte Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.



Fig. 142, *Polystichum longistipes* HAYATA.

**Polystichum simplicipinnum** HAYATA sp. nov. (Fig. 137-j et 146).

Rhizoma ascendens apice cespitosum frondigerum. Stipes 6-7 cm. longus latere compressus gracillimus medio  $\frac{1}{2}$  mm. latus basi dense squamatus a basi sursum glabratus vel sparse squamatus stramineus supra profunde 3-sulcatus subtus convexus. Frons lineari-lanceolata 17 cm. longa 28 mm. lata caudato-acuminata, acuminibus  $2\frac{1}{2}$ -3 cm. longis minus 5 mm. latis angustissime linearibus, pinnata :

pinnæ subsessiles pinnis superioribus exceptis æquilongæ, pinnis infimis longioribus vel brevioribus pinnatis vel simplicibus, pinnis superioribus gradatim brevioribus ad lobos acuminis caudiformis abeuntibus, pinnis mediis 12 mm. longis 4 mm. latis lineari-quadrangularibus apice abrupte aristato-acutis basi latere inferiore angustissime cuneatis, latere superiore auriculatis latissimis margine

Fig. 146, *Polystichum simplicipinnum* HAYATA.

parte basilari excepta irregulariter aristato-serrulatis; textura tenuiter chartacea, utraque pagina fere glabra fere per totam paginam sorifera. Sori prope costam siti; rhachis frondis gracillima supra tenuiter sulcata paucissime squamata, pinnis mediis a se 5-6 mm. remotis.

HAB. Kōshūn: Botanrosha, leg. G. NAKAHARA, Dec. 1906, (No. 930).

*Pteris* LINN.

***Pteris Takeoi***

HAYATA sp. nov. (Fig. 148). Rhizoma crassiusculum dense radicans, radicibus fibrosis pilis dense obtectis; squamis rhizomatis apicalis oblongis apice acutis  $3\frac{1}{2}$ -2 mm. longis  $\frac{1}{2}$ -1 mm. latis apice acuminatis ad summum acutis basi truncatis vel subtruncatis. Frons sterilis: eam fertilem in longitudine valde superans quam ea major. Stipes glaberrimus rubescens 25 cm. longus basi 3-4 mm. crassus supra planus profunde angustissime sulcatus subtus convexus vel angulatus ad angulum obtusus in sectione obtuse triangularis nitidus rubrofulvescens; frons in



Fig. 148, *Pteris Takeoi* HAYATA  $\times \frac{2}{15}$ .



ambitu oblongo-ovata 45cm. longa 19cm. lata apice in ambitu acuminata basi in ambitu rotundato-obtusa pinnata sed sursum pinnatifida, pinnis suboppositis, jugis inferioribus a se 8cm. remotis, in specimine nostro 6-jugis, jugis 4 inferioribus basi contractis plus minus petiolatis, jugis 2 superioribus basi cum rhachibus connatis vel decurrentibus a se 2cm. remotis; pinnis infimis in ambitu semi-oblongis circ. 20cm. longis 8cm. latis circ. ad rhachin pinnatifidis sursum falcato-recurvatis, segmentis in toto 3 vel 4; segmentis lateralibus totis latere superiore pinnæ infimæ sitis, vel latere superiore 2, latere inferiore 1 sitis, segmento terminali lineari 15cm. longo 18mm. lato apice acuminato sursum falcato-recurvo apice lineari-acuminato basi angustiore ad rhachin attenuato margine integro, segmentis lateralibus superioribus majoribus quam dimidio segmenti terminalis brevioribus 1cm. latis lineari-lanceolatis apice acuminatis basi plus minus contractis latere interiore superiore haud decurrentibus, latere exteriori inferiore subito ad rhachin cuneatim decurrentibus, interiore falcato-recurvis, margine sursum ad acumen plus minus crosso-crenulatis cæterum integris, segmentis inferioribus paullo minoribus eis superioribus conformibus basi latere superiore subrectis basi latere inferiore subito recurvis decurrentibus ad rhachin et usque ad axillas pinnarum attingentibus; pinnis inferioribus in ambitu semi-lanceolatis subsessilibus latere superiore usque ad rhachin pinnatifidis latere inferiore integris haud pinnatifidis, segmento terminali lanceolato 13cm. longo 2cm. lato cum eis pinnarum infimarum conformi sed paullo minore recto vel sursum falcato-recurvo; pinnis superioribus simplicibus interiore sursum recurvis; frons sursum versus apicem pinnatifida, segmento terminali lineari-lanceolato 13cm. longo apice acuminato, segmentis lateralibus superioribus dimidium segmenti terminalis in longitudine paullo superantibus suboppositis latere inferiore ad rhachin frondis cuneato-attenuatis a se 2cm. remotis; textura membranacea vel chartacea pallido-viridescens utraque glabra; rhachis frondis glabra supra plana subtus angulata ad angulos obtusa supra medio profunde sulcata, costa pinnarum et segmentorum supra impressa plus minus sulcata subtus elevata, venis lateralibus primariis parallelis haud reticulatis e basi vel supra basin furcato-ramosis, ramis parallelis haud ramosis vel iterum ad medium furcato-ramulosis, ramulis parallelis prope marginem evanescentibus sed ad marginem haud attingentibus apice clavatis sub luce transversa distincte visis.

Frons fertilis: quam ea sterilis minor conformis vel angustior pinnis longissime linearibus chartaceis; segmenta pinnarum vel frondum margine toto longitudine sorifera. Indusium marginale tenuissime membranaceum 1mm. latum.

HAB. Mt. Arisan, Taroven, leg. TAKEO Itō, Aprili. 1914.

*Vittaria* SM.

**Vittaria** sp. No. I. (Fig. 149-a). Epiphytica ad truncos arboris crescens. Rhizoma dense squamatum dense frondigerum, squamis castaneo-fuscentibus 4-6 mm. longis basi  $\frac{1}{2}$  mm. latis linearibus basi latissimis  $\frac{1}{2}$  mm. latis apice subulato-acuminatis margine remote setulosis. Stipes supra subnullus subtus complanatus basi squamatus. Frons longissime linearis usque ad 30 cm. longa usque ad 3 mm. lata apice acuminatissima basi gradatim attenuata glabra margine integra margine haud vel vix recurva glabra. Textura chartaceo-coriacea, costa supra vix vel distincte elevata subtus plana haud elevata vel plus minus impressa. Sori ad sulcos marginales siti.

HAB. Shinko: Mai, leg. U. MORI, Juli. 1906 (No. 1322).

Very near *V. elongata* Sw.; but differs from it by the much smaller fronds with elevated costae. Color and cellular structure of the scales are also different.

**Vittaria arisanensis** HAYATA (Fig. 149-b, c) Ic. Pl. Formos. IV. p. 243, fig. 169. Descriptio auctata: Squamæ apicis rhizomatis lineari-lanceolatæ 5-8 mm. longæ  $\frac{1}{2}$ -1 mm. latæ apice acuminatissimæ basi haud contractæ haud nigricantes tenuissimæ fusco-castaneæ.

**Vittaria** sp. No. II. (Fig. 149-d, e, f). Epiphytica ad truncos arboris crescens. Rhizoma dense squamatum et dense frondigerum, squamis fuscentibus lineari-lanceolatis cum iis *Vittarie suberectæ* conformibus paullo majoribus. Stipes basi dense squamato excepto glaber brevis subtetragonus. Frons longe linearis 35 cm. longa 6 mm. lata apice acuminatissima basi gradatim attenuata ad stipitem brevem abeuns glabra. Textura tenuiter coriacea. Sori intramarginales, marginibus valde deorsum curvatis.

HAB. inter Urai et Raga, leg. K. MIYAKE, Oct. 1899.

Near *Vittaria suberecta* HAYATA, but distinguishable from it by the thinner fronds with much more recurved margins.

**Vittaria mediosora** HAYATA sp. nov. (Fig. 149-g, h, i). Epiphytica. Rhizoma dense squamatum dense frondigerum: squamis caducissimis fuscentibus

linearilanceolatis apice subulato-acuminatis basi latissimis 4-5 mm. longis basi 1 mm.- $\frac{1}{2}$  mm. latis margine subintegris vel remote serrulatis. Stipes basi dense squamatus sursum glabratus dorso complanatus in sectione lentiformis 2-4 cm. longus  $\frac{1}{2}$  mm. latus. Frons linearis 15-30 cm. longa  $1\frac{1}{2}$ -2 mm. lata apice obtusa basi gradatim attenuata ad stipitem abeuns margine integra margine tenuiter deorsum recurva  $\omega$ -formis in sectione, in sectione ad marginem acuta, costa supra vix impressa subtus vix elevata. Sori ad medium inter costas et margines siti. Textura tenuiter chartacea. Receptaculum sororum costa plus approximatum quam margine situm subtus tenuissime elevatum.

HAB. Mt. Arisan, Tōzan ad 7800 ped. alt., leg. S. SASAKI, Mart. 1913.

Very distinct for its very narrower fronds with soriferous veins on the nearly midway between the costas and margins.

**Vittaria** sp. No. III. (Fig. 149-j, k). Epiphytica ad truncos arboris crescens subrecta plus minus curvato-descendens. Rhizoma cum basibus stipitum dense squamatum, squamis persistentibus fusco-nigricantibus linearilanceolatis 2 mm. longis apice subulato-acuminatis margine remote setulosi, dense frondigerum. Stipes atro-purpureus basi dense squamatus sursum glaber brevissimus subtetragonus supra sulcatus. Frons longissime linearis 20-50 cm. longa  $3\frac{1}{2}$ -8 mm. lata apice acuminatissima basi gradatim attenuata ad stipitem brevissimum abeuns margine integerrima in exsiccato deorsum recurva utraque pagine glaberrima, costa supra impressa subtus prominente elevata; textura crassa in exsiccato valde



Fig. 149; a, *Vittaria* sp. No. I.; a portion of a scale on the rhizome; b, *V. arisanensis* HAY.; a scale on the rhizome; c, margin of the same, showing cellular structure; d, *Vittaria* sp. No. II.; cross section of the frond; e, marginal portion of the same; f, central portion of the same; g, *V. mediosora* HAY.; h, marginal portion of the same; i, cross section of the frond; j, a scale on the rhizome of *Vittaria* sp. No. III.; k, cross section of the same species; l, a scale on the rhizome of *Vittaria* sp. No. IV.; m, cross section of the frond of the same species.

coriacea, venis sub luce transversa haud visis. Sori intra-marginales.

HAB. Mt. Arisan, inter Mingetsu et Senninbora, leg. B. HAYATA et TAKEO ITÔ, Aprili. 1914.

**Vittaria** sp. No. IV. (Fig. 149-l, m). Epiphytica ad truncos arboris crescens. Rhizoma dense squamis obtectum, squamis angustissime linearibus 7-8 mm. longis basi  $\frac{1}{4}$  mm. latis apice subulato-acuminatis margine remote setulosis fuscentibus. Stipes 5 cm. longus basi dense squamatus supra basin sursum glaber basi atro-purpureus subtetragonus latere compressus. Frons longissime linearis 80 cm. longa 7-8 mm. lata apice gradatim acuminatissima, partibus superioribus minus quam 2 mm. latis 3-4 cm. longis, basi gradatim attenuata ad stipitem abeuns, partibus inferioribus attenuatis minus quam 2 mm. latis 13 cm. longis circ. usque ad basin stipitum abeuntibus, margine integra deorsum tenuiter recurva ad marginem tenuissima acuta in sectione, costa supra impressa subtus prominente elevata. Sori intramarginales. Textura chartacea vel chartaceo-coriacea.

HAB. Urai? leg. TAKEO ITÔ, 1914.

Near *Vittaria arisanensis* HAYATA, but quite distinguishable from it by the blackish scales of the rhizomes. Also near *Vittaria suberecta* HAYATA, but differs from it in having very much thinner margins and thinner texture; from *V. japonica*, the present species is distinguishable by the cellular structure of the scales, which are a little darker than those of *V. japonica*.

#### **Woodwardia** SMITH.

**Woodwardia Harlandii** HOOK. Exot. Fer. t. 7; HOOK. et BAKER Syn. Fil. p. 189.

HAB. Taihoku: Ganzanko, leg. TAKEO ITÔ, Mai. 1915.

Our fern accords pretty well with the figures given in HOOKER's Exotic Ferns.

**Woodwardia Takeoi** HAYATA sp. nov. Rhizoma ignotum. Stipes 38 cm. longus basi fusco-nigricans basi sursum stramineus basi sparse squamatus, squamis minutis, sursum haud squamatus glaberrimus. Frons in ambitu triangularis 25 cm. longa 27 cm. lata apice perfecte triangulari-acuta vel ad summum subito acuminata basi latissima plus minus cordata vel truncata bipinnatifida vel basi usque ad rhachin secta sursum minus fida apice haud fida; pinnis oppositis

vel suboppositis vel segmentis infimis ovato-lanceolatis 18 cm. longis 8 cm. latis apice acuminatis basi abrupte cuneatis sessilibus pinnatilobis, lobis alternis inferioribus longissimis obscure dentatis, dentibus argute serrulatis superioribus gradatim brevioribus gradatim ad nullum reductis margine duplicato-serrulatis mediis linearibus 4-5 cm. longis 6 mm. latis apice acuminatis basi haud contractis, sinibus inter lobos mediis linearibus fundo 6 mm. latis rotundatis a costa 5 mm. distantibus; pars elobata pinnarum infimarum triangulari-acuminata  $2\frac{1}{2}$  cm. longa 5 mm. lata argute serrulata; pinnis segmentis lobisque a rhachide frondis vel a costa pinnarum angulo  $60^{\circ}$ - $80^{\circ}$  egressis; pinnis infimis a se 3 cm. remotis, superioribus minus remotis; textura chartacea pagina utraque glabra, in exsiccato pallidissima; costis et venis lorum pinnarum gracilibus utraque pagine tenuiter elevatis, venulis ubique reticulatis supra haud visis subtus tenuissime elevatis visis. Sori pagine frondis præter partem apicalem toto siti secus costas pinnarum et secus costulas lorum utroque latere 1-seriatim dispositi lineares 7-10 mm. longi 1 mm. lati supra elevati subtus impressi.

HAB. Taihoku: Ganzanko, leg. TAKEO ITÔ, Mai. 1915.

Somewhat allied to *Woodwardia Harlandii* Hook. and *W. Kempii* COPEL., but widely different from them by the triangular fronds which are bipinnately parted or lobed.



## INDEX.

*Orders in capital type; genera and species in roman type; synonyms  
and species incidentally mentioned in italic type.*

<b>ACANTHACEÆ</b> .. .. .	135	<b>Antrophyum</b> KAULF. .. .. .	261
<i>Acrostichum angulatum</i> MOORE .. .. .	294	„ <i>acnium</i> BLUME .. .. .	309
<b>Actinodaphne</b> NEES. .. .. .	169	„ <i>coriaceum</i> BLUME .. .. .	309
„ <i>hypoleucophylla</i> HAYATA .. .. .	169	„ <i>Cumingii</i> FÉE .. .. .	262
„ <i>morrisonensis</i> HAYATA .. .. .	171	<b>ARALIACEÆ</b> .. .. .	74
„ <i>mushcensis</i> HAYATA .. .. .	171	<b>Archangiopteris</b> CHRIST et GIESENHA- GEN. .. .. .	256
„ <i>nantensis</i> HAYATA .. .. .	172	„ <i>Somai</i> HAYATA .. .. .	256
„ <i>pedicellata</i> HAYATA .. .. .	172	<b>Ardisia</b> GLERTN. .. .. .	88
<b>Adiantum</b> LINN. .. .. .	261	„ <i>citrifolia</i> HAYATA .. .. .	88
„ <i>hispidulum</i> Sw? .. .. .	261	„ <i>cornudentata</i> MEZ .. .. .	88
<b>ALISMACEÆ</b> .. .. .	248	„ <i>cornudentata</i> MEZ .. .. .	93
<b>Alniphyllum</b> MATSUM. .. .. .	120	„ <i>crispa</i> (THUNB.) A. DC. .. .. .	89
„ <i>hainanense</i> HAYATA .. .. .	120	„ <i>formosana</i> ROLFE .. .. .	89
„ <i>pterosperrum</i> MATSUM. .. .. .	121	„ <i>Konishii</i> HAYATA .. .. .	89
<b>Alphitonia</b> REISSEK. .. .. .	28	„ <i>kotensis</i> HAYATA .. .. .	90
„ <i>excelsa</i> REISSEK. .. .. .	28	„ <i>kusukusensis</i> HAYATA .. .. .	90
<b>Alpinia</b> LINN. .. .. .	215	„ <i>Oldhami</i> MEZ .. .. .	91
„ <i>chinensis</i> .. .. .	216	„ <i>pentagona</i> A. DC. .. .. .	91
„ <i>fluvialis</i> HAYATA .. .. .	227	„ <i>quinqueгона</i> BLUME .. .. .	91
„ <i>formosana</i> K. SCHUM. .. .. .	226	„ <i>radicans</i> HEMSL. et MEZ. .. .. .	91
„ <i>hainanensis</i> K. SCHUM. .. .. .	225	„ <i>remotiserrata</i> HAYATA .. .. .	92
„ <i>intermedia</i> GAGN. .. .. .	217	„ <i>Sieboldii</i> .. .. .	89
„ <i>japonica</i> Miq. .. .. .	219	„ <i>stenosepala</i> HAYATA .. .. .	92
„ <i>Katsumadai</i> HAYATA .. .. .	224	„ <i>suishaensis</i> HAYATA .. .. .	93
„ <i>Kawakamii</i> HAYATA .. .. .	222	<b>Arisæma</b> MART. .. .. .	241
„ <i>kelungensis</i> HAYATA .. .. .	216	„ <i>alienatum</i> var. .. .. .	243
„ <i>koshunensis</i> HAYATA .. .. .	227	„ <i>brachyspatha</i> HAYATA .. .. .	241
„ <i>macrocephala</i> HAYATA .. .. .	223	„ <i>concinnum</i> SCHOTT. .. .. .	243
„ <i>mesanthera</i> HAYATA .. .. .	225	„ <i>consanguineum</i> SCHOTT. .. .. .	242
„ <i>mutans</i> ROSC. .. .. .	227	„ <i>formosana</i> HAYATA .. .. .	243
„ <i>oblongifolia</i> HAYATA .. .. .	215	„ <i>formosana</i> HAYATA form. <i>stenophylla</i> .. .. .	244
„ <i>officinatum</i> HAYATA .. .. .	219	„ <i>grapsospadix</i> HAYATA .. .. .	244
„ <i>Pricei</i> HAYATA .. .. .	219	„ <i>kelung-insularis</i> HAYATA .. .. .	246
„ <i>Sasakii</i> HAYATA .. .. .	220	„ <i>laminatum</i> BLUME .. .. .	246
„ <i>Shimadai</i> HAYATA .. .. .	219	„ <i>penicillatum</i> N. E. BROWN .. .. .	246
„ <i>speciosa</i> K. SCHUM. .. .. .	227	„ <i>ringens</i> SCHOTT .. .. .	246
„ <i>uraiensis</i> HAYATA .. .. .	224	„ <i>Thunbergii</i> BLUME .. .. .	241
<b>AMARYLLIDÆÆ</b> .. .. .	228	„ <i>Takeoi</i> HAYATA .. .. .	246
<b>AMPELIDÆÆ</b> .. .. .	30		

<b>ARISTOLOCHIACEÆ</b> .. .. .	137	<b>Blyxa japonica</b> MAX. .. .. .	209
<b>Aristolochia</b> LINN. ....	137	" <i>levissima</i> HAYATA .. .. .	208
" <i>cucurbitifolia</i> HAYATA ..	137	" <i>Shimadai</i> HAYATA .. .. .	209
" <i>Fordiiana</i> HEMSL. ....	139	" <i>Somai</i> HAYATA .. .. .	210
" <i>Kämpferi</i> .. .. .	139	<b>BURMANNIACEÆ</b> .. .. .	211
<b>AROIDEÆ</b> .. .. .	238	<b>Burmanniea</b> LINN. ....	211
<b>Asarum</b> LINN. ....	139	" <i>cryptopetala</i> MAKINO .. ..	213
" <i>albonaculata</i> HAYATA .. ..	139	" <i>Itoana</i> MAKINO .. .. .	213
" <i>caudigerum</i> HANCE .. .. .	148	" <i>japonica</i> .. .. .	212
" <i>epigynum</i> HAYATA .. .. .	140	" <i>liukiensis</i> HAYATA .. .. .	211
" <i>geophilum</i> HEMSL. ....	141	" <i>Takeoi</i> HAYATA .. .. .	212
" <i>grandiflorum</i> HAYATA .. ..	141	<b>CAPRIFOLIACEÆ</b> .. .. .	76
" <i>grandiflorum</i> HAYATA var. <i>colo-</i>		<i>Catimbium</i> .. .. .	232
<i>casifolium</i> HAYATA .. .. .	144	<b>CELASTRINEÆ</b> .. .. .	15
" <i>hypogynum</i> HAYATA .. .. .	144	<b>Celastrus</b> LINN. ....	20
" <i>infrapurpureum</i> HAYATA ..	146	" <i>geminiflorus</i> HAYATA .. ..	25
" <i>leptophyllum</i> HAYATA .. ..	147	" <i>gracillimus</i> HAYATA .. .. .	24
" <i>leptophyllum</i> HAYATA var.		" <i>Kusumoi</i> HAYATA .. .. .	20
<i>triangulare</i> HAYATA .. ..	148	" <i>leiocarpus</i> HAYATA .. .. .	22
" <i>macranthum</i> HOOK .. .. .	149	" <i>longe-racemosus</i> HAYATA ..	23
" <i>maximum</i> .. .. .	144	<b>Cheilanthes</b> SW. ....	262
" <i>taitonense</i> HAYATA .. .. .	148	" <i>farinosa</i> KAULE .. .. .	262
<b>Asplenium</b> LINN. ....	262	<b>Chirita</b> HAM. ....	133
" <i>Hancockii</i> MAXIM. ....	268	" <i>anachorata</i> HANCE? .. .. .	135
" <i>heterophlebium</i> METT. ....	274	" <i>minuteserrulata</i> HAYATA ..	133
" <i>resectum</i> SW. var. <i>obliquis-</i>		<b>Cinnamomum</b> BURMAN .. .. .	152
<i>simum</i> HAYATA .. .. .	262	" <i>acuminatifolium</i> HAYATA ..	152
<i>Autalpinia</i> .. .. .	215	" <i>acuminatissimum</i> HAYATA ..	153
<b>BALANOPHOREÆ</b> .. .. .	198	" <i>bartheifolium</i> HAYATA .. ..	153
<b>Balanophora</b> FORST. ....	198	" <i>caudatifolium</i> HAYATA .. ..	155
" <i>formosana</i> HAYATA .. .. .	198	" <i>Döderleinii</i> ENGL. ....	154
" <i>Kawakamii</i> .. .. .	198	" <i>insulari-montanum</i> HAYA-	
" <i>morrisonicola</i> HAYATA .. ..	198	TA .. .. .	157
" <i>mutinoides</i> HAYATA .. .. .	198	" <i>Kanahirai</i> HAYATA .. .. .	157
<b>Bauhinia</b> LINN. ....	35	" <i>macrostemon</i> HAYATA .. ..	158
" <i>Championi</i> BENTH. ....	35	" <i>micranthum</i> HAYATA .. .. .	158
<b>Beilschmiedia</b> NEES. ....	150	" <i>obovatifolium</i> HAYATA .. ..	158
" <i>erythrophloia</i> HAYATA .. ..	150	" <i>pseudo-Loureirii</i> HAYATA ..	158
" <i>Tanakae</i> HAYATA .. .. .	150	" <i>randaiense</i> HAYATA .. .. .	159
<b>BERBERIDEÆ</b> .. .. .	2	" <i>reticulatum</i> HAYATA .. .. .	160
<b>Berberis</b> LINN. ....	4	<b>Circæa</b> LINN. ....	71
" <i>Kawakamii</i> HAYATA .. .. .	4	" <i>erubescens</i> FR. et SAV. ....	72
" <i>mingetensis</i> HAYATA .. .. .	4	" <i>Kawakamii</i> HAYATA .. .. .	71
<i>Biforia japonica</i> VAN TIEGHEM ..	188	" <i>Pricei</i> HAYATA .. .. .	72
<b>Blyxa</b> THOU. ....	208	<b>Clinogyne</b> SALISB .. .. .	228
" <i>caulescens</i> MAX. ....	209	" <i>dichotoma</i> SALISB? .. .. .	228
" <i>ecaudata</i> HAYATA .. .. .	208	<b>Colocasia</b> LUDW. ....	247
" <i>echinosperma</i> CLARKE .. ..	210	" <i>antiquorum</i> SCHOTT. ....	248



- Colocasia** *kotensis* HAYATA .. .. . 247  
**CONIFERÆ** .. .. . 204  
**CONVOLVULACEÆ** .. .. . 125  
**CORIARIÆÆ** .. .. . 33  
**Coriaria** LINN. .. .. . 33  
 „ *intermedia* MATSUM. .. .. . 34  
 „ *japonica* .. .. . 34  
 „ *nepalensis* WALL. .. .. . 34  
 „ *sinica* MAXIM. .. .. . 34  
 „ *summicola* HAYATA .. .. . 33  
**Cotoneaster** MEDIK. .. .. . 62  
 „ *disticha* LANGE .. .. . 64  
 „ *morrisonensis* HAYATA .. .. . 62  
 „ *rokiudaisanensis* HAYATA .. .. . 63  
 „ *rotundifolia* BAKER .. .. . 64  
**Cryptocarya** R. BR. .. .. . 151  
 „ *Konishii* HAYATA .. .. . 151  
**Cunninghamia** R. BR. .. .. . 207  
 „ *Kawakamii* HAYATA .. .. . 207  
**Cuscuta** LINN. .. .. . 125  
 „ *chinensis* LAM. .. .. . 125  
 „ *Grasii* DELPONTE .. .. . 125  
 „ *Kawakamii* HAYATA .. .. . 125  
**Cyclophorus** DESV. .. .. . 264  
 „ *Lingua* DESV. var. *angusti-*  
   *frons* HAYATA .. .. . 264  
 „ *subfissus* HAYATA .. .. . 264  
 „ *taiwanensis* C. CH. .. .. . 264  
**Cyclostemon** BLUME .. .. . 198  
 „ *karapinense* HAYATA .. .. . 198  
**Dayallia** SM. .. .. . 265  
 „ *chrysanthemifolia* HAYATA .. .. . 265  
**Dennstædtia** BERNH. .. .. . 266  
 „ *cuneata* (J. SM. et Hk.)  
   CHRIST .. .. . 266  
 „ *leptophylla* HAYATA .. .. . 266  
 „ *scabra* MOORE .. .. . 267  
 „ *Smithii* MOORE .. .. . 266  
**Diplazium** SW. .... 268  
 „ *Hancockii* (MAX.) HAYATA .. .. . 268  
 „ *heterophlebium* DIELS .. .. . 274  
 „ *iridiphyllum* HAYATA .. .. . 272  
 „ *Makinoi* YABE var. *karapi-*  
   *nense* HAYATA .. .. . 272  
 „ *odoratissimum* HAYATA .. .. . 273  
**Diplospora** DC. .. .. . 77  
 „ *Tanakai* HAYATA .. .. . 77  
 „ *viridiflora* DC. .. .. . 79
- Disporopsis** HANCE .. .. . 230  
 „ *arisanensis* HAYATA .. .. . 230  
 „ *leptophylla* HAYATA .. .. . 232  
*Donax Arundinaceum* LOUR. .. .. . 228  
**Dryopteris** ADANS. .... 275  
 „ *erubescens* (WALL.) C. CHR. 275  
 „ *hirsutisquama* HAYATA .. .. . 277  
 „ *Kawakamii* HAYATA .. .. . 287  
 „ *kotensis* HAYATA .. .. . 279  
 „ *kwashotensis* HAYATA .. .. . 278  
 „ *mingetsunensis* HAYATA .. .. . 281  
 „ *morrisonensis* HAYATA .. .. . 281  
 „ *oppositipinna* HAYATA .. .. . 281  
 „ *polylepis* C. CH. .... 293  
 „ *pseudo-Sabiei* HAYATA .. .. . 283  
 „ *punctata* C. CH. .... 297  
 „ *reflexipinna* HAYATA .. .. . 285  
 „ *Sabiei* .. .. . 283  
 „ *sacholepis* HAYATA .. .. . 285  
 „ *Sōmai* HAYATA .. .. . 287  
 „ *spinulosa* O. Ktze. var. *mor-*  
   *risonensis* .. .. . 281  
 „ *subfuvialis* .. .. . 288  
 „ *Takeoi* HAYATA .. .. . 289  
 „ *transmorrisonensis* HAYATA .. .. . 291  
**Elaphoglossum** SCHOTT. .... 293  
 „ *laurifolium* (THOUARS)  
   MOORE .. .. . 293  
**Embelia** JUSS. .... 84  
 „ *lenticellata* HAYATA .. .. . 86  
 „ *penduliramula* HAYATA .. .. . 84  
**Epipremnum** SCHOTT. .... 239  
 „ *formosanum* HAYATA .. .. . 239  
 „ *mirabile* SCHOTT .. .. . 240  
 „ *pinnatum* (LINN.) .. .. . 240  
**Euonymus** LINN. .... 15  
 „ *arboricolas* HAYATA .. .. . 17  
 „ *euphlebiophyllus* HAYATA .. .. . 15  
 „ *pellucidifolius* HAYATA .. .. . 16  
 „ *Spraguei* HAYATA .. .. . 18  
 „ *Tanake* Miq. .... 18  
**EUPHORBACEÆ** .. .. . 198  
**Euphrasia** LINN. .... 129  
 „ *borneensis* STAFF. .... 129  
 „ *transmorrisonensis* HAYATA .. .. . 129  
**Galium** LINN. .... 81  
 „ *gracile* BUNGE .. .. . 81  
 „ *gracile* BUNGE forma *rotundi-*

folia .. .. .	81	<b>Leptochilus</b> Kanashiroi HAYATA ..	298
<b>GESNERACEÆ</b> .. .. .	131	"    virens (WALL.) C. CHR.	301
<i>Gonyanthus nepalensis</i> MIEBS ..	212	"    virens .. .. .	298
<b>GOODENOVIÆ</b> .. .. .	83	<b>Ligustrum</b> LINN. .. .. .	123
<b>GRAMINEÆ</b> .. .. .	250	"    Pricei HAYATA .. .. .	123
<i>Gymnogramme avenia</i> BAKER ..	309	<b>LILIACEÆ</b> .. .. .	229
" <i>lanceolata</i> HK. .. .. .	324	<b>Lindera</b> THUNB. .. .. .	176
<i>Gymnopteris virens</i> BEDD. .. .. .	301	"    akensis HAYATA .. .. .	176
<b>Hamamelideæ</b> .. .. .	71	"    communis HEMSLE. .. .. .	176
<b>Hedychium</b> KENIG .. .. .	214	"    formosana HAYATA .. .. .	178
" <i>coronarum</i> KENIG .. .. .	214	"    glaucæ BLUME var. Kawakamii	
<b>Heterosmilax</b> KUNTH. .. .. .	235	HAYATA .. .. .	178
" <i>arisanensis</i> HAYATA ..	235	"    Oldhami HEMSLE. .. .. .	178
" <i>Gaultherioides</i> MAXIM.	236	"    Pricei HAYATA .. .. .	178
<b>Hydrangea</b> LINN. .. .. .	70	"    randaiensis HAYATA .. .. .	179
" <i>integra</i> HAYATA .. .. .	70	"    strychnifolia S. et Z. .. .. .	179
<b>HYDROCHARIDEÆ</b> .. .. .	208	<b>Lindsaya</b> DRY. .. .. .	301
<b>HYMENOPHYLLACEÆ</b> .. .. .	256	"    orbiculata (LAM.) METT. ..	301
<b>Hymenophyllum</b> LINN. .. .. .	256	<b>Linociera</b> SW. .. .. .	123
" <i>crispato-alatum</i> HAYATA ..	256	" <i>Cumingiana</i> VIDAL .. .. .	123
" <i>crispato-alatum</i> HAYATA form. re-		<b>Litosanthes</b> BLUME. .. .. .	81
motipinnum .. .. .	257	" <i>gracilis</i> HAYATA .. .. .	81
" <i>javanicum</i> HAYATA .. .. .	257	<b>Litsea</b> LAM. .. .. .	163
" <i>Simonsianum</i> HOOKER .. .. .	258	" <i>acutivena</i> HAYATA .. .. .	163
<b>Hypolepis</b> BERNH. .. .. .	295	"    akensis HAYATA .. .. .	166
" <i>alte-gracillima</i> HAYATA ..	295	" <i>brideliifolia</i> HAYATA .. .. .	166
" <i>tenuifolia</i> BERNH. .. .. .	297	" <i>dolichocarpa</i> HAYATA .. .. .	166
<b>Hypoxis</b> LINN. .. .. .	228	" <i>hypophæa</i> HAYATA .. .. .	167
" <i>aurea</i> LOUR. .. .. .	228	" <i>Nakaii</i> HAYATA .. .. .	168
<b>Ilex</b> LINN. .. .. .	15	<b>Lophotocarpus</b> DURAND .. .. .	248
" <i>glomeratiflora</i> HAYATA ..	15	" <i>formosanus</i> HAYATA .. .. .	249
<b>ILICINEÆ</b> .. .. .	15	<b>LORANTHACEÆ</b> .. .. .	180
<b>Kæmpferia</b> LINN. .. .. .	213	<b>Loranthus</b> LINN. .. .. .	180
" <i>hainanensis</i> HAYATA .. .. .	213	" <i>chinensis</i> DC. .. .. .	180
<i>Korthalsella japonica</i> ENGL. ..	188	" <i>lonicerifolius</i> HAYATA .. ..	181
<b>Læstrea Filix-Mas</b> var. <i>odontoloma</i> MOORE	281	" <i>Phœbe-formosana</i> HAYATA ..	183
" <i>undulata</i> THWAITES .. .. .	285	" <i>ritozenensis</i> HAYATA .. .. .	184
<b>LAURINEÆ</b> .. .. .	150	" <i>rhododendricolus</i> HAYATA ..	184
<i>Lecanopteris formosana</i> HAYATA ..	311	" <i>seraggodo-temor</i> HAYATA ..	185
<b>LEGUMINOSÆ</b> .. .. .	35	" <i>theifer</i> HAYATA .. .. .	186
<b>Leptochilus</b> KAUL. .. .. .	297	<b>Loropetalum</b> R. BR. .. .. .	71
" <i>angustipinnus</i> HAYATA ..	297	" <i>chinense</i> R. BR. .. .. .	71
" <i>Bonii</i> C. CH. .. .. .	300	<i>Loxotis obliqua</i> .. .. .	133
" <i>Harlandii</i> C. CH. .. .. .	300	<b>LYCOPODIACEÆ</b> .. .. .	252
		<b>Lycopodium</b> LINN. .. .. .	252
		" <i>lucidulum</i> MICHEX. .. .. .	253
		" <i>quasipolytrichoides</i> HAYATA ..	252

<b>Lycopodium</b> <i>reflexo-integrum</i> HAYATA. . . . .	254
" <i>Somai</i> HAYATA. . . . .	255
<b>Machilus</b> NEES. . . . .	160
" <i>arisanensis</i> HAYATA. . . . .	160
" <i>Fuberi</i> HEMSLE. . . . .	160
" <i>formosana</i> HAYATA. . . . .	162
" <i>kwashotensis</i> HAYATA. . . . .	160
" <i>longispala</i> HAYATA. . . . .	160
" <i>macrophylla</i> HEMSLE. var.	
<i>arisanensis</i> HAYATA. . . . .	160
" <i>pseudolongifolia</i> HAYATA. . . . .	160
" <i>suffrutescens</i> HAYATA. . . . .	162
" <i>zuihensis</i> HAYATA. . . . .	162
<b>Mahon</b> a NUTT. . . . .	5
" <i>japonica</i> (THUNB.) DC. . . . .	6
" <i>tikushiensis</i> HAYATA. . . . .	5
<b>Maranta</b> <i>dichotoma</i> WALL. . . . .	228
<b>MARATTIACEÆ</b> . . . . .	256
<b>Mercurialis</b> LINN. . . . .	199
" <i>leucocarpa</i> SIEB. et ZUCC. . . . .	200
" <i>transmorisonensis</i> HAYATA. . . . .	199
<b>Micrargeria</b> BENTH. . . . .	125
" <i>formosana</i> HAYATA. . . . .	126
<b>Microlepia</b> PRESL. . . . .	301
" <i>hirsutissima</i> HAYATA. . . . .	301
<b>Modecca</b> LAM. . . . .	73
" <i>formosana</i> HAYATA. . . . .	78
<b>Murraya</b> LINN. . . . .	14
" <i>omphalocarpa</i> HAYATA. . . . .	14
<b>MYRSINÆÆ</b> . . . . .	84
<b>Myrsine</b> LINN. . . . .	87
" <i>vacciniifolia</i> HAYATA. . . . .	87
<b>Nervilia</b> GAUD. . . . .	213
" <i>yeyamensis</i> HAYATA. . . . .	213
<b>Nipholobolus</b> <i>fissus</i> BLUME. . . . .	264
<b>Notholæna</b> R. BR. . . . .	303
" <i>hirsuta</i> Desv. . . . .	303
<b>Nothophœbe</b> BLUME. . . . .	163
" <i>Konishii</i> HAYATA. . . . .	163
<b>OLEACEÆ</b> . . . . .	123
<b>ONAGRARIÆÆ</b> . . . . .	71
<b>ORCHIDÆÆ</b> . . . . .	213
<b>Osmanthus</b> LOUR. . . . .	125
" <i>integrifolius</i> HAYATA. . . . .	125
" <i>lanceolatus</i> HAYATA. . . . .	125
<b>Ottelia</b> PERS. . . . .	210
" <i>alismoides</i> PERS. . . . .	210
<b>PASSIFLOREÆ</b> . . . . .	76
<b>Pedicularis</b> LINN. . . . .	126
" <i>transmorisonensis</i> HAYATA. . . . .	126
" <i>verticillata</i> LINN. . . . .	128
<b>Pentapanax</b> SEEM. . . . .	74
" <i>castanopsisicola</i> HAYATA. . . . .	74
<b>Peranema</b> DON. . . . .	305
" <i>formosana</i> HAYATA. . . . .	305
<b>Perrottetia</b> H. B. et K. . . . .	26
" <i>arisanensis</i> HAYATA. . . . .	26
<b>Phœbe</b> NEES. . . . .	162
" <i>formosana</i> HAYATA. . . . .	162
<b>Photinia</b> LINDE. . . . .	65
" <i>amphidoxa</i> REHDER et WILLSON. . . . .	68
" <i>ardisifolia</i> HAYATA. . . . .	65
" <i>Beauverdiana</i> SCHNEIDER var.	
<i>notabilis</i> REHDER. . . . .	65
" <i>impressivena</i> HAYATA. . . . .	67
" <i>lucida</i> SCHNEIDER. . . . .	68
" <i>serrulata</i> LINDE. . . . .	69
" <i>taiwanensis</i> HAYATA. . . . .	69
<b>Phrynium</b> WILLD. . . . .	228
" <i>dichotomum</i> ROXB. . . . .	228
" <i>capitatum</i> WILLD. . . . .	228
<b>Phyllostachys</b> SIEB. et ZUCC. . . . .	250
" <i>Makinoi</i> HAYATA. . . . .	250
<b>PITTOSPOREÆÆ</b> . . . . .	6
<b>Pittosporum</b> BANKS. . . . .	6
" <i>daphniphyloides</i> HAYATA. . . . .	6
" <i>oligospermum</i> HAYATA. . . . .	7
<b>Podophyllum</b> LINN. . . . .	2
" <i>Onzoi</i> HAYATA. . . . .	2
" <i>pleioanthum</i> HANCE. . . . .	4
<b>Polybotrya</b> HUMB. et BONPL. . . . .	305
" <i>appendiculata</i> HAYATA. . . . .	307
" <i>duplicato-serrata</i> HAYATA. . . . .	305
" <i>marginata</i> BLUME. . . . .	306
<b>Polygonatum</b> ADANS. . . . .	229
" <i>alte-lobatum</i> HAYATA. . . . .	229
<b>POLYPODIACEÆ</b> . . . . .	261
<b>Polypodium</b> LINN. . . . .	308
" <i>aspidistifrons</i> HAYATA. . . . .	308
" <i>Blumeanum</i> C. CH. . . . .	309
" <i>contiguum</i> SMITH. . . . .	311
" <i>ensato-sessilifrons</i> HAYATA. . . . .	312
" <i>ensatum</i> THUNB. . . . .	312
" <i>ensatum</i> HAYATA. . . . .	314
" <i>hemionitideum</i> WALL. . . . .	314

- Polypodium** hypochrysum HAYATA .. 314  
 " infra-planicostale HAYATA 315  
 " *irioides* LAM. . . . . 309  
 " Kanashiroi HAYATA .. 317  
 " Kawakamii HAYATA .. 318  
 " kusukusense HAYATA .. 319  
 " morrisonense HAYATA .. 321  
 " obscure-venulosum HAYA-  
 TA .. . . . 322  
 " remote-frondigerum HAYA-  
 TA .. . . . 322  
 " *taiwanensis* CHRIST .. . 264  
 " urceolare HAYATA .. . 324  
 " *Wrightii* METT. . . . . 321  
**Polystichum** ROTH... .. 332  
 " aculeatum Sw. var. vari-  
 forme HAYATA .. . 332  
 " *amabile* SM... .. 337  
 " *auriculatum* PRESL .. . 338  
 " Hancockii DIEB. . . . . 340  
 " hololepis HAYATA .. . 332  
 " leptopterum HAYATA.. . 340  
 " longistipes HAYATA .. . 341  
 " nitakayamense HAYATA .. 333  
 " obtuso-auriculatum HAYATA 337  
 " pseudo-Maximowiczii HA-  
 YATA.. . . . 334  
 " simplicipinnum HAYATA .. 343  
 " subapiciflorum HAYATA .. 335  
 " *transmorrisonense* HAYATA 291  
 " *tripteron* PRESL... .. 339  
 " *varium* PRESL. . . . . 332  
**Pothos** LINN. .. . . . 238  
 " *seemanni* SCHOTT.. . . . 239  
 " *Warburgii* ENGL... .. 239  
**Prinsepia** ROYLE. . . . . 69  
 " *scandens* HAYATA.. . . . 69  
*Probolocalyx*... .. 218  
**Prunus** LINN. . . . . 35  
 " *macrophylla* SIEB. et ZUCC. . 35  
 " *transisanensis* HAYATA.. . 37  
**PSEUDIXIEÆ** HAYATA.. . . 187  
**Pseudixus** HAYATA.. . . . 187  
 " *japonicus* HAYATA .. . 188  
**Pseudotsuga** CARR... .. 204  
 " *Wilsoniana* HAYATA .. . 204  
 " *japonica* HAYATA .. . 205  
**Pteris** LINN. . . . . 344  
**Pteris** Takeoi HAYATA .. . . 344  
**RANUNCULACEÆ** .. . . . 1  
**Rapanea** AUBL. . . . . 87  
 " *neriifolia* (SIEB. et ZUCC.)  
 Mez. . . . . 87  
**RHAMNEÆ** .. . . . 28  
**Rhynchoglossum** BLUME .. . 131  
 " *hologlossum* HAYATA 131  
 " *obliquum* HAYATA .. 132  
**Rohdea** ROTH. . . . . 236  
 " *Watanabei* HAYATA.. . . 236  
**ROSACEÆ** .. . . . 35  
**Rosa** LINN.... .. 58  
 " *moschata* MILL. . . . . 60  
 " *Pricei* HAYATA .. . . . 58  
 " *serrata* ROLFE .. . . . 60  
**RUBIACEÆ**.. . . . 77  
**Rubus** LINN. . . . . 39  
 " *aculeatiflorus* HAYATA.. . 39  
 " *adenotrichopoda* HAYATA .. 49  
 " *conduplicatus* DUTHIE.. . 57  
 " *euphlebohyllus* HAYATA .. 44  
 " *fraxinifolius* HAYATA .. . 46  
 " *fraxinifolius* POIR. . . . . 48  
 " *glanduloso-calycinus* HAYATA .. 42  
 " *hirsuto-pungens* HAYATA .. 58  
 " *Kawakamii* HAYATA .. . . 58  
 " *ningetsensis* HAYATA .. . 40  
 " *parvialiiifolius* HAYATA .. . 48  
 " *parvifraxinifolius* HAYATA.. . 52  
 " *parvipungens* HAYATA .. . 56  
 " *parvirosefolius* HAYATA .. . 54  
 " *piptopetalus* HAYATA .. . 51  
 " *rosefolius* SMITH subsp. *Maxim-*  
*owiczii* HAYATA.. . . . 55  
 " *Swinhoei* HAYATA.. . . . 51  
 " *tagallus* MATSUM. . . . . 52  
 " *taitensis* HAYATA .. . . . 40  
 " *Thunbergii* S. et Z. . . . . 58  
**RUTACEÆ** .. . . . 10  
**SABIACEÆ** .. . . . 31  
**Sabia** COLEBR... .. 31  
 " *transisanensis* HAYATA .. . 31  
**Sageretia** BRONGN. . . . . 28  
 " *hamosa* BRONG. . . . . 28  
 " *randaiensis* HAYATA .. . 29  
**Sagittaria** LINN. . . . . 250  
 " *pygmaea* MIQ... .. 250

<b>SALICINEÆ</b> .. . . .	201
<b>Salix</b> LINN. . . . .	201
" <i>Doii</i> HAYATA .. . . .	201
" <i>fulvopubescens</i> HAYATA .. . . .	201
" <i>Morii</i> HAYATA .. . . .	203
" <i>transarisanensis</i> HAYATA .. . . .	203
<b>SAXIFRAGEÆ</b> .. . . .	70
<b>Scævola</b> LINN. . . . .	83
" <i>hainanensis</i> HANCE .. . . .	83
<b>SCITAMINEÆ</b> .. . . .	213
<b>Schizandra</b> MICHX. . . . .	1
" <i>arisanensis</i> HAYATA .. . . .	1
" <i>rubriflora</i> REHDER et WILSON .. . . .	2
<b>SCROPHULARIACEÆ</b> .. . . .	126
<b>Serissa</b> COMM. . . . .	79
" <i>Kawakamii</i> HAYATA .. . . .	79
<b>Skimmia</b> THUNE. . . . .	10
" <i>arisanensis</i> HAYATA .. . . .	11
" <i>distincte-venulosa</i> HAYATA .. . . .	10
" <i>japonica</i> HAYATA .. . . .	14
" <i>melanocarpa</i> REHDER et WILSON .. . . .	11
" <i>orthoclada</i> HAYATA .. . . .	13
<b>Smilax</b> LINN. . . . .	232
" <i>arisanensis</i> HAYATA .. . . .	232
" <i>nervo-marginata</i> HAYATA .. . . .	232
<b>Stachyurus</b> SIEB. ET ZUCC. . . . .	8
" <i>himalaicus</i> HOOK. f. et THOMS. . . . .	8
" <i>præcox</i> HAYATA .. . . .	9
<b>Strobilanthes</b> BLUME. . . . .	135
" <i>flexicaulis</i> HAYATA .. . . .	135
<b>STYRACEÆ</b> .. . . .	93
<b>Styrax</b> LINN. . . . .	121
" <i>formosanum</i> MATSUM. . . . .	121
" <i>Hayataianum</i> PERK. . . . .	121
" <i>Henryi</i> PERK. . . . .	121
" <i>kotensis</i> HAYATA .. . . .	121
<b>Symplocos</b> LINN. . . . .	93
" <i>adinandriifolia</i> HAYATA .. . . .	93
" " HAYATA var. <i>theifolia</i> HAYATA .. . . .	95
" <i>congesta</i> BENTH. . . . .	103
" <i>divaricativena</i> HAYATA .. . . .	96
" <i>Doii</i> HAYATA .. . . .	96
" <i>eribotryæfolia</i> HAYATA .. . . .	98
" <i>eristroma</i> HAYATA .. . . .	99

<b>Symplocos</b> <i>Fordii</i> HAYATA .. . . .	118
" <i>glomeratiflora</i> HAYATA .. . . .	100
" <i>heishanensis</i> HAYATA .. . . .	101
" <i>ilicifolia</i> HAYATA .. . . .	102
" <i>japonica</i> A.DC. var. <i>Nakaharai</i> HAYATA .. . . .	103
" <i>Kawakamii</i> HAYATA .. . . .	104
" <i>Konishii</i> HAYATA .. . . .	105
" <i>kotensis</i> HAYATA .. . . .	106
" <i>microcalyx</i> HAYATA .. . . .	108
" <i>microcarpa</i> CHAMP. . . . .	109
" <i>macrostroma</i> HAYATA .. . . .	107
" <i>morrisonicola</i> HAYATA .. . . .	110
" <i>neriifolia</i> S. et Z. . . . .	99
" <i>phæophylla</i> HAYATA .. . . .	111
" <i>risekiensis</i> HAYATA .. . . .	112
" <i>Nakaii</i> HAYATA .. . . .	110
" <i>Sasakii</i> HAYATA .. . . .	114
" <i>spicata</i> ROXB. . . . .	115
" <i>spicata</i> ROXB. var. <i>acuminata</i> BRAND .. . . .	115
" <i>stenostachys</i> HAYATA .. . . .	115
" <i>suishariensis</i> HAYATA .. . . .	116
" <i>trichoclada</i> HAYATA .. . . .	118
" <i>wikstromiifolia</i> HAYATA .. . . .	119
<b>TERNSTREMIACEÆ</b> .. . . .	8
<b>Tetradenia</b> NEES. . . . .	172
" <i>acuminatissima</i> HAYATA .. . . .	172
" <i>acuto-trinervia</i> HAYATA .. . . .	172
" <i>aurata</i> HAYATA .. . . .	174
" <i>Konishii</i> HAYATA .. . . .	174
" <i>kotensis</i> HAYATA .. . . .	174
" <i>parvigemma</i> HAYATA .. . . .	175
" <i>variabilima</i> HAYATA .. . . .	176
<b>Thea</b> LINN. . . . .	9
" <i>parvifolia</i> HAYATA .. . . .	10
" <i>salicifolia</i> (CHAMP.) .. . . .	9
" <i>transarisanensis</i> HAYATA .. . . .	10
<b>THYMELÆACEÆ</b> .. . . .	179
<b>Thysanosperrum</b> CHAMP. . . . .	81
" <i>diffusum</i> CHAMP. . . . .	81
<b>Trichomanes</b> SW. . . . .	260
" <i>cupressifolium</i> HAYATA .. . . .	260
" <i>kalamocarpum</i> HAYATA .. . . .	260
" <i>insigne</i> VAN BOSCH. . . . .	260
" <i>orientale</i> HAYATA .. . . .	260
" <i>palmifolium</i> HAYATA .. . . .	260

<b>Trillium</b> LINN. . . . .	232	<b>Viscum</b> liquidambaricolum HAYATA . .	194
„ Tschonoskii MAXIM. . . . .	232	„ moniliforme BLUME . . . . .	188
<b>Tsuga</b> CARR. . . . .	206	„ moniliforme (B. C.) var. cora-	
„ formosana HAYATA . . . . .	206	lioides WIGHT . . . . .	188
<i>Tupistra Watanabei</i> HAYATA . . . . .	236	„ moniliforme (B. C.) WIGHT . .	188
<b>Ulmus</b> LINN. . . . .	201	„ multinerve HAYATA . . . . .	196
„ Uyematsui HAYATA . . . . .	201	„ Querci-Morii HAYATA . . . . .	196
<b>URTICACEÆ</b> . . . . .	201	<b>Vitis</b> LINN. . . . .	30
<b>VACCINIACEÆ</b> . . . . .	84	„ arisanensis HAYATA . . . . .	30
<b>Vaccinium</b> LINN. . . . .	84	„ bioritsensis HAYATA . . . . .	31
„ emarginatum HAYATA . . . . .	84	„ dentata HAYATA . . . . .	31
<b>VALERIANEÆ</b> . . . . .	82	„ triphylla HAYATA . . . . .	31
<b>Valeriana</b> LINN. . . . .	82	„ shifunensis HAYATA . . . . .	31
„ flaccidissima MAX. . . . .	82	<b>Vittaria</b> SM. . . . .	346
„ Kawakamii HAYATA . . . . .	82	„ arisanensis HAYATA . . . . .	346
<b>Veronica</b> LINN. . . . .	128	„ mediosora HAYATA . . . . .	346
„ oligosperma HAYATA . . . . .	128	<b>Wikstroemia</b> ENDL. . . . .	179
„ spuria LINN. var. angustifolia		„ japonica MIQ. . . . .	180
BENTH. . . . .	129	„ mononectaria HAYATA . .	179
<b>Viburnum</b> LINN. . . . .	76	<b>Woodwardia</b> SMITH . . . . .	348
„ taiitense HAYATA . . . . .	76	„ Harlandii HOOK. . . . .	348
„ taiwanensis HAYATA . . . . .	76	„ Takeoi HAYATA . . . . .	348
<b>Viscum</b> LINN. . . . .	190	<b>XYRIDEÆ</b> . . . . .	237
„ aphyllum GRIFF. . . . .	190	<b>Xyris</b> LINN. . . . .	237
„ articulatum FRANCH. et SAVAT. .	188	„ formosana HAYATA . . . . .	237
„ bongariense HAYATA . . . . .	190	„ pauciflora WILLD. . . . .	238
„ diospyrosicolum HAYATA . . . . .	192	<b>Zingiber</b> ADANS. . . . .	214
„ filipendulum HAYATA . . . . .	193	„ Zerumbet ROSE. . . . .	214
„ japonicum THUNB. . . . .	188		

ICONES PLANTARUM FORMOSANARUM.

V.

PLATE I.

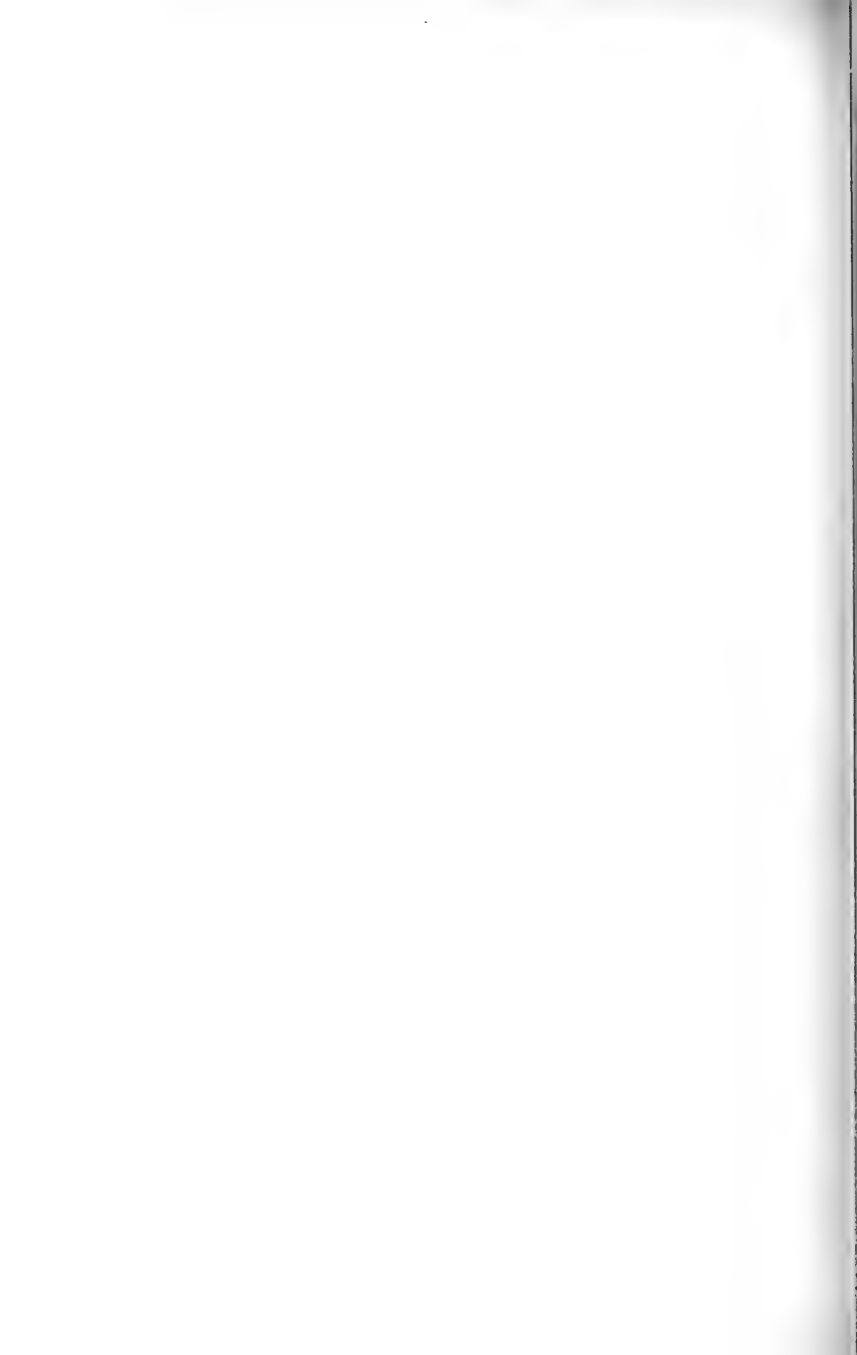
## Explanation of Pl. I.

*Schzandra arisanensis* HAYATA.

- Fig. 1. The plant, natural size.  
2. A leaf, natural size.  
3. A male flower,  $\times 2$ .  
4. An outer sepal,  $\times 4$ .  
5. An inner sepal,  $\times 4$ .  
6. Staminal cluster,  $\times 4$ .  
7, 8, 9. A stamen, seen from different sides,  $\times 4$ .  
10. A female flower,  $\times 2$ .  
11. The same, sepals partly taken off, showing carpels,  $\times 2$ .  
12. Cluster of carpels,  $\times 5$ .  
13, 14. A carpel, seen from different sides, more magnified.  
15. A portion of the stigma, much more magnified.







ICONES PLANTARUM FORMOSANARUM.

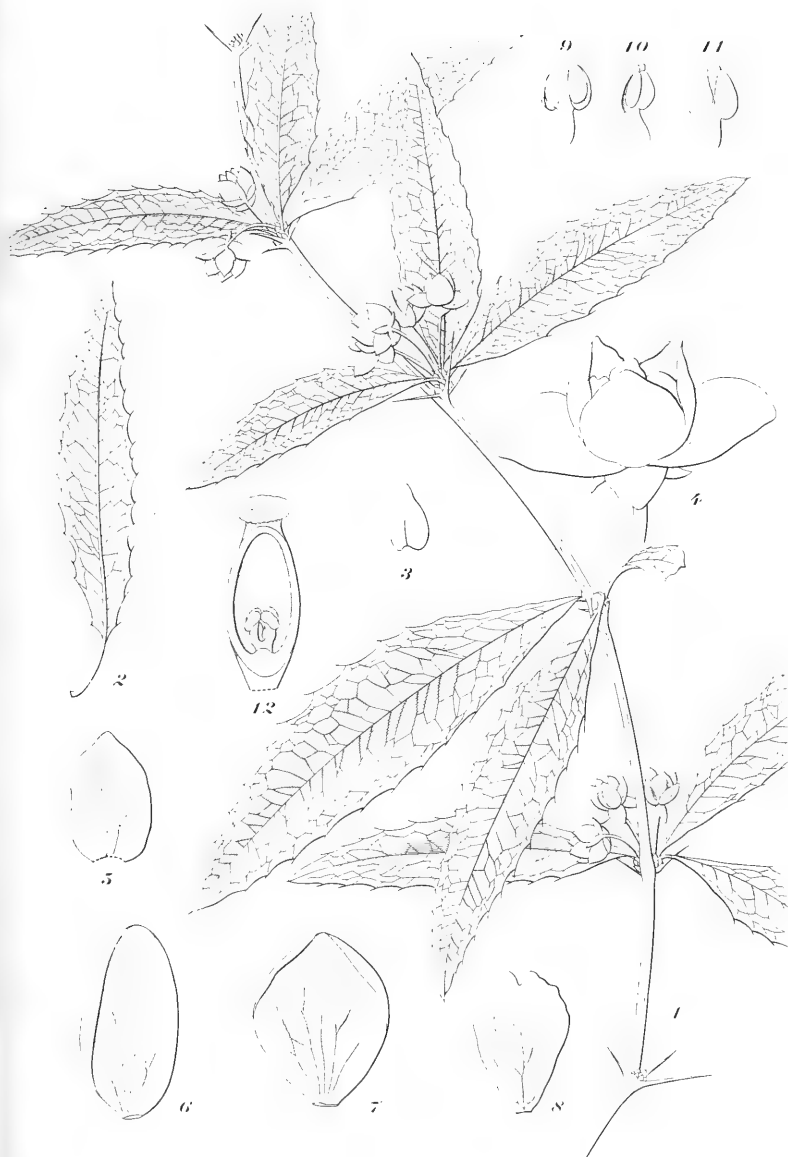
**v.**

PLATE II.

## Explanation of Pl. II.

*Berberis mingetsensis* HAYATA.

- Fig. 1. A branch of the plant.  
2. A leaf.  
3. A bracteole,  $\times 5$ .  
4. A flower,  $\times 4.5$ .  
5. The outermost sepal,  $\times 5$ .  
6. An inner sepal,  $\times 5$ .  
7. The innermost sepal,  $\times 5$ .  
8. A petal  $\times 5$ .  
9, 10, 11. A stamen, seen from different sides.  
12. Ovary, wall partly taken off, ovules seen.





ICONES PLANTARUM FORMOSANARUM.

V.

PLATE III.

### Explanation of Pl. III.

*Celastrus longe-racemosus* HAYATA.

- Fig. 1. The plant, natural size.  
2. A leaf, natural size.  
3. A bract, magnified.  
4. A flower,  $\times 7$ .  
5. A petal,  $\times 10$ .  
6. A flower in section, petals taken off,  $\times 10$ .  
7. Margin of a sepal, magnified.  
8. Margin of a petal, magnified.







ICONES PLANTARUM FORMOSANARUM.

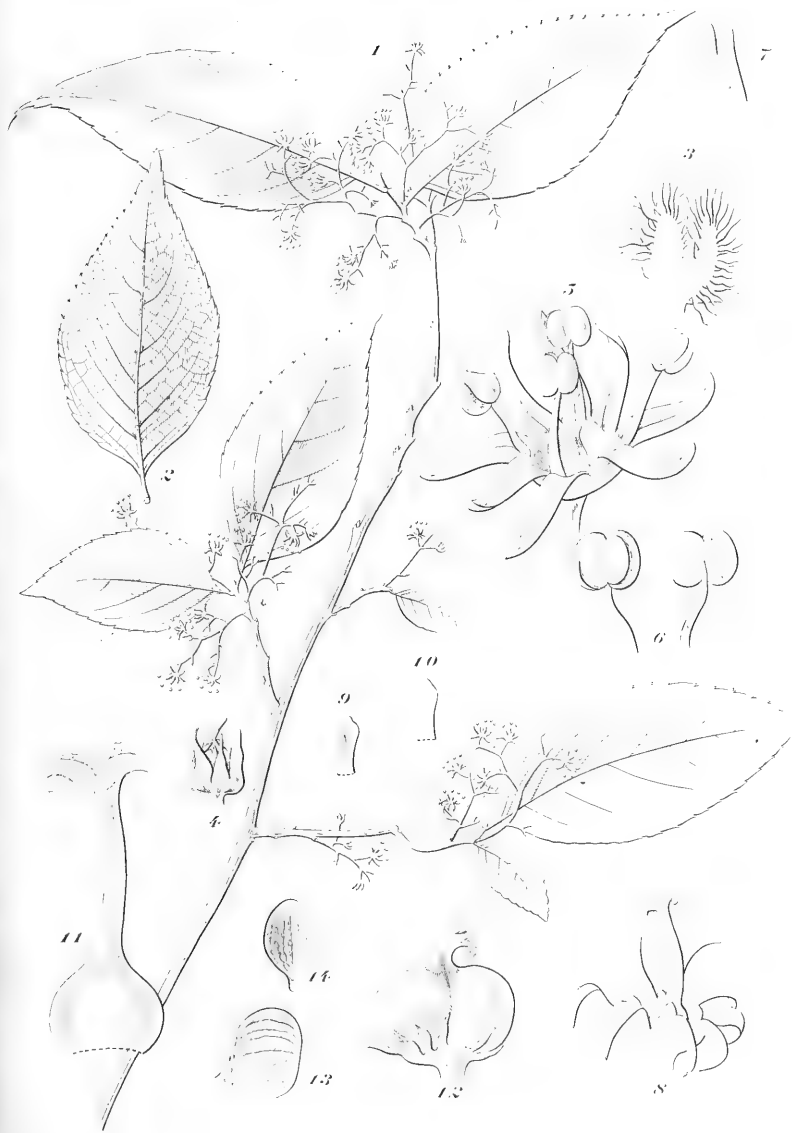
**v.**

PLATE IV.

## Explanation of Pl. IV.

*Perrottetia arisanensis* HAYATA.

- Fig. 1. A branch.  
2. A leaf.  
3. A bract.  
4. A flower-bud.  
5. A male flower,  $\times 10$ .  
6. Stamens, seen from different sides.  
7. Rudimentary ovary.  
8. A female flower,  $\times 15$ .  
9, 10. Staminodes, seen from different sides.  
11. Ovary.  
12. A fruit,  $\times 8$ .  
13. A seed, seen from side.  
14. The same, seen from top.





ICONES PLANTARUM FORMOSANARUM.

**v.**

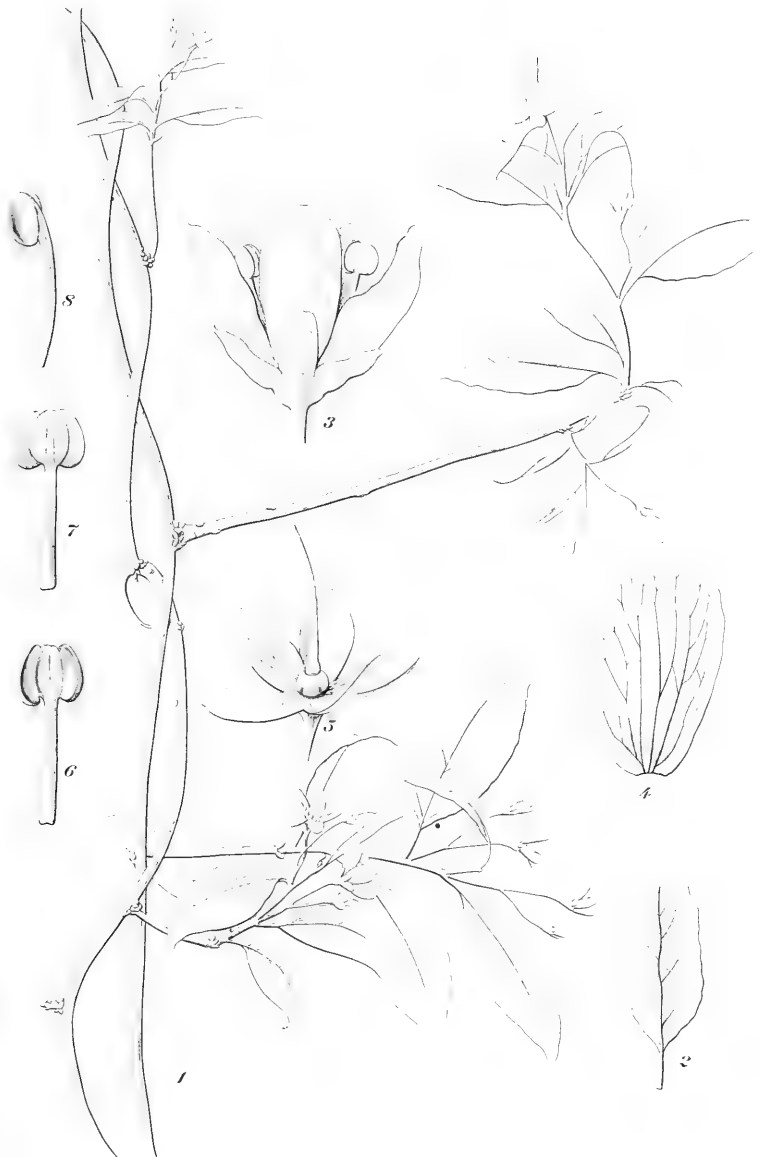
PLATE V.

### Explanation of Pl. V.

*Sabia transarisanensis* HAYATA.

- Fig. 1. A branch, natural size.  
2. A leaf, natural size.  
3. A flower,  $\times 5$ .  
4. A petal,  $\times 7$ .  
5. A flower, petals taken off,  $\times 5$ .  
6, 7, 8. A stamen, seen from different sides,  $\times 7$ .







ICONES PLANTARUM FORMOSANARUM.

V.

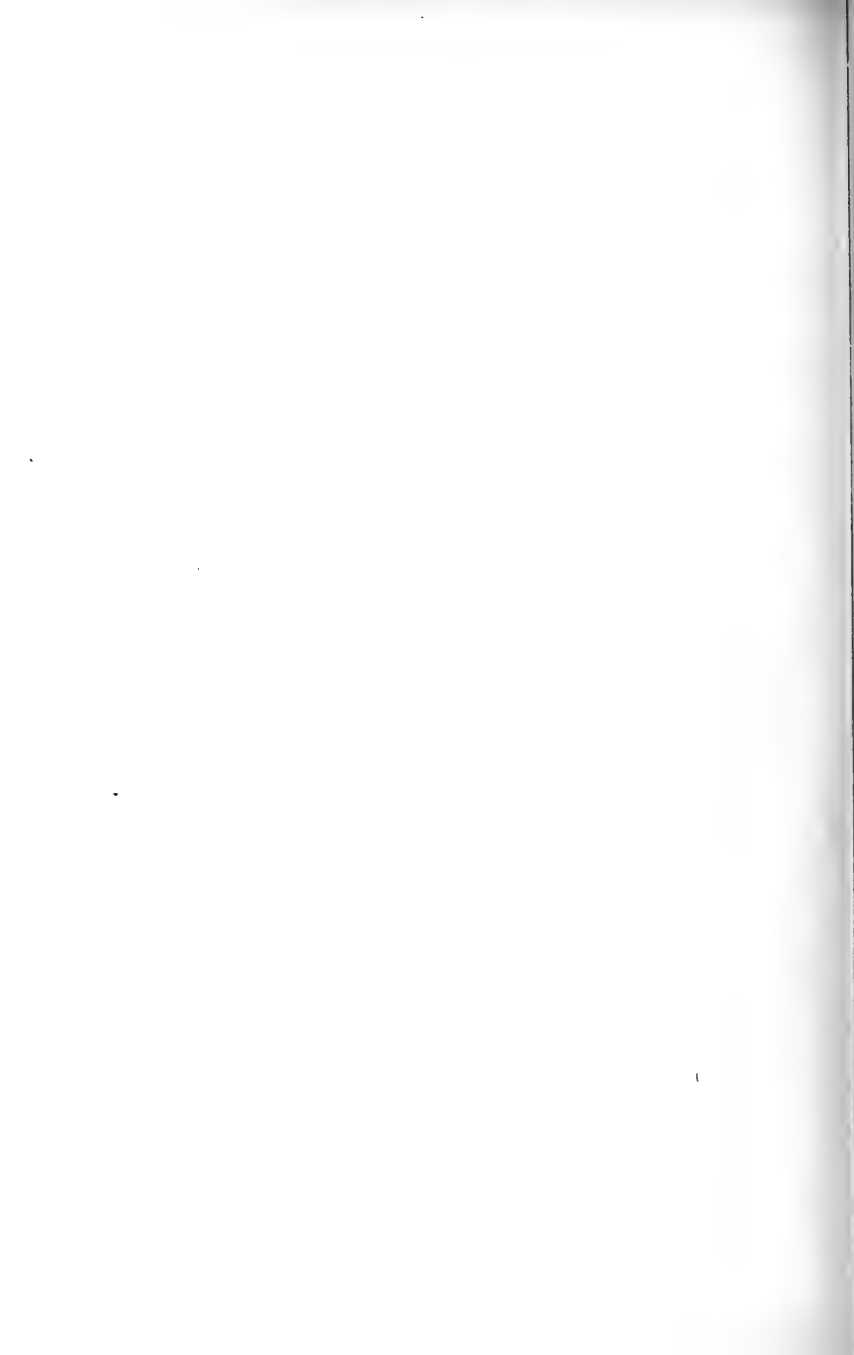
PLATE VI.

## Explanation of Pl. VI.

*Coriaria summicola* HAYATA.

- Fig. 1. The plant, natural size.
2. A male flower,  $\times 4$ .
3. An outer sepal,  $\times 8$ .
4. A male flower, outer sepals taken off, inner sepals and petals seen,  $\times 12$ .
- 5, 6. A petal, seen from different sides,  $\times 12$ .
- 7, 8, 9. A stamen, seen from different sides,  $\times 12$ .
10. A female flower,  $\times 4$ .
11. A sepal,  $\times 8$ .
12. A petal, seen from within,  $\times 8$ .
13. The same, seen from side,  $\times 8$ .
14. A female flower, some sepals and petals taken off, showing carpels and staminodes,  $\times 8$ .
- 15, 16, 17. Staminodes  $\times 12$ .
18. A carpel with a staminode,  $\times 8$ .
19. Apical portion of stigma, much more magnified.





ICONES PLANTARUM FORMOSANARUM.

V.

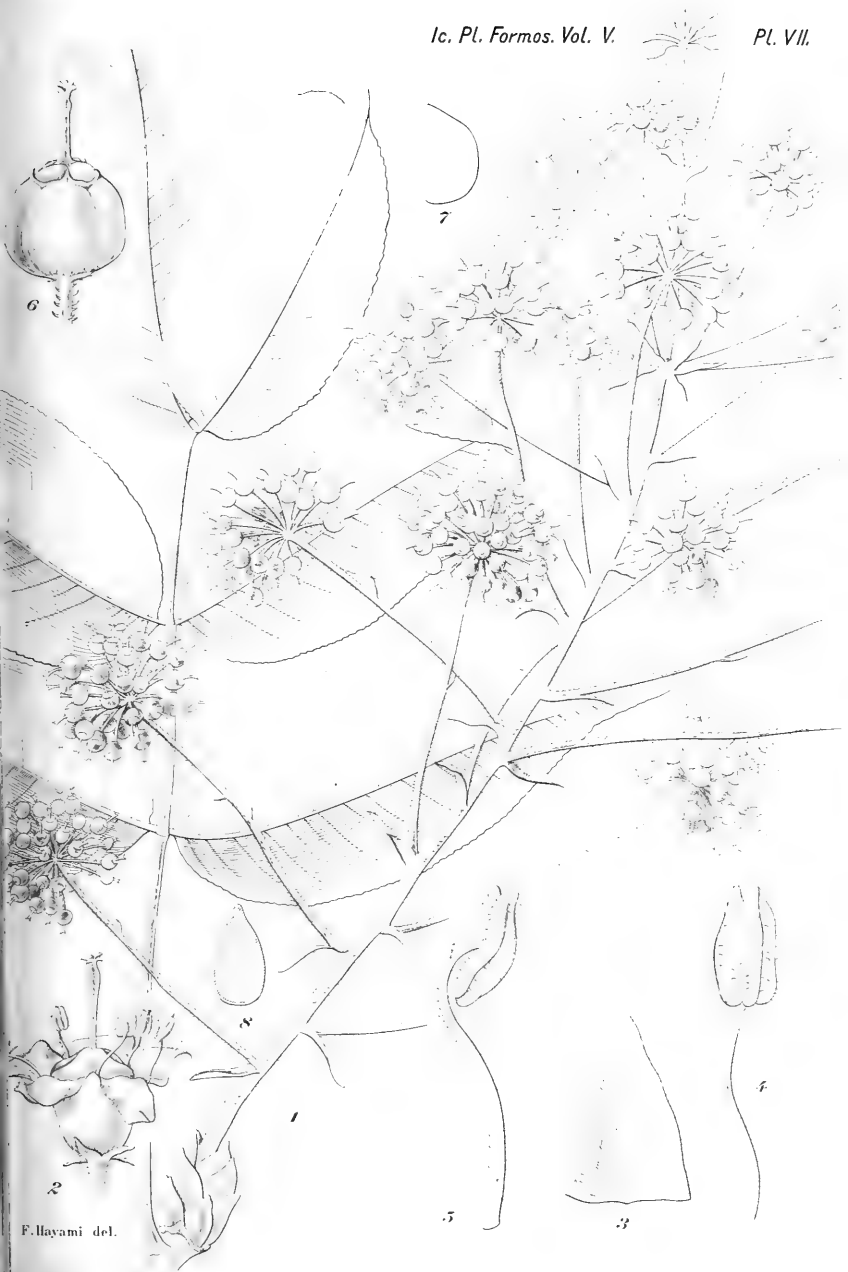
PLATE VII.

### Explanation of Pl. VII.

*Pentapanax castanopsicola* HAYATA.

- Fig. 1. The plant.  
2. A flower.  
3. A petal.  
4, 5. Stamens.  
6. Ovary.  
7. A seed.  
8. The same, in section.







ICONES PLANTARUM FORMOSANARUM.

**V.**

PLATE VIII.

### Explanation of Pl. VIII.

*Valeriana Kawakamii* HAYATA.

- Fig. 1. The plant.  
2. Inflorescence.  
3. A bract.  
4. A flower.  
5. Corolla, expanded.  
6. Style.  
fig. 1, natural size ; others more or less magnified.





ICONES PLANTARUM FORMOSANARUM.

**v.**

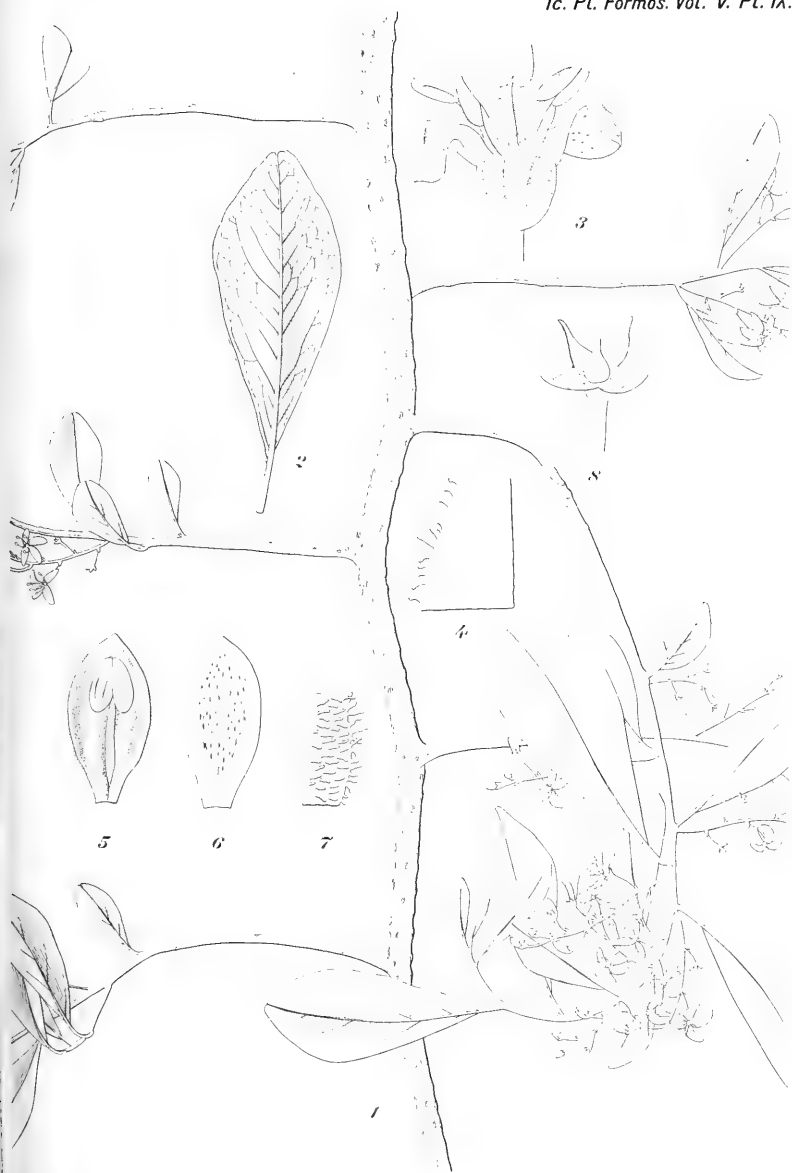
PLATE IX.

### Explanation of Pl. IX.

*Embelia penduliramula* HAYATA.

- Fig. 1. A branch, natural size.  
2. A leaf, natural size.  
3. A male flower,  $\times 8$ .  
4. Margin of a calyx-lobe, much more magnified.  
5. A petal, seen from within,  $\times 8$ .  
6. The same, seen from without,  $\times 8$ .  
7. Margin of a petal, much more magnified.  
8. Calyx and rudimentary ovary,  $\times 8$ .







ICONES PLANTARUM FORMOSANARUM.

V.

PLATE X.

### Explanation of Pl. X.

*Symplocos eriobotryaefolia* HAYATA.

- Fig. 1. A branch, natural size.
2. A flower,  $\times 6$ .
3. A bracteole,  $\times 9$ .
4. Calyx,  $\times 9$ .
5. A corolla-segment,  $\times 6$ .
6. Apical portion of a corolla-segment, seen from within, much more magnified.
- 7, 8. A stamen, seen from different sides,  $\times 9$ .
9. Basal portion of a style,  $\times 9$ .
10. Apical portion of the same,  $\times 9$ .





ICONES PLANTARUM FORMOSANARUM.

V.

PLATE XI.

### Explanation of Pl. XI.

*Rhynchoglossum hologlossum* HAYATA.

- Fig. 1. The plant.  
2. A leaf.  
3. A flower.  
4. Corolla, expanded.  
5. Stamens, seen from front.  
6. The same, seen from back.  
7. A stamen, detached.  
8. Ovary, disc seen.
- Fig. 1 and 2, natural size; others more or less magnified.







ICONES PLANTARUM FORMOSANARUM.

v.

PLATE XII.

## Explanation of Pl. XII.

*Chirita minuteserrulata* HAYATA.

- Fig. 1. The plant, natural size.
2. A bract,  $\times 4$ .
3. A flower,  $\times 2$ .
4. Calyx, expanded,  $\times 2$ .
5. Corolla, expanded,  $\times 2$ .
- 6, 7. Stamens, seen from different sides, magnified.
8. A staminode, much more magnified.
9. Ovary,  $\times 4$ .





ICONES PLANTARUM FORMOSANARUM.

**v.**

PLATE XIII.

### Explanation of Pl. XIII.

*Viscum Querci-Morii* HAYATA.

- Fig. 1. The plant on *Quercus Morii* HAYATA.  
2. A branch.  
3. A male flower in an involucre on a node.  
4. The same, seen from a little above.  
5. The same, involucre taken off.  
6. A female flower bud in an involucre.  
7. The same, involucre taken off.  
8. Another female, fully grown.  
9. A sepal of the same flower.  
10. Another female flower, more advanced, sepals fallen off.  
11. The same, seen from a little above.  
12. Vertical section of the same.  
13. A young fruit.  
14. A mature fruit.  
15. A seed with a viviparous embryo.  
16. Another seed.  
17. The same, seen from side.  
18. Another seed.  
19. The same, seen from side.  
20. An embryo, taken from a fruit, shown in Fig. 14.  
21. A node of a branch.  
22. A portion of a branchlet.  
Fig. 1, reduced; 2, natural size; others more or less magnified.







ICONES PLANTARUM FORMOSANARUM

**v.**

PLATE XIV.

### Explanation of Pl. XIV.

*Salix transarisanensis* HAYATA.

- Fig. 1. A branch with male catkins, natural size.  
2. A male flower,  $\times 5.5$ .  
3. Another flower seen from back, gland and bract taken off,  $\times 15$ .  
4. A bract,  $\times 15$ .  
5. A gland,  $\times 15$ .  
6. A female catkin, natural size.  
7. A female flower,  $\times 7.5$ .  
8. A bract,  $\times 15$ .  
9. A gland.  
10, 11. Stigma, seen from different sides.





ICONES PLANTARUM FORMOSANARUM.

V.

PLATE XV.

### Explanation of Pl. XV.

*Pseudotsuga Wilsoniana* HAYATA.

- Fig. 1. A branch with a cone.  
2. Another branch with a smaller cone.  
3. A portion of a young branch, showing hairs on the branch.  
4. A scale detached from the middle portion of a cone.  
5. The same, seen from within.  
6. A bract-scale.  
7. The same, seen from side.  
8. A seed.







ICONES PLANTARUM FORMOSANARUM.

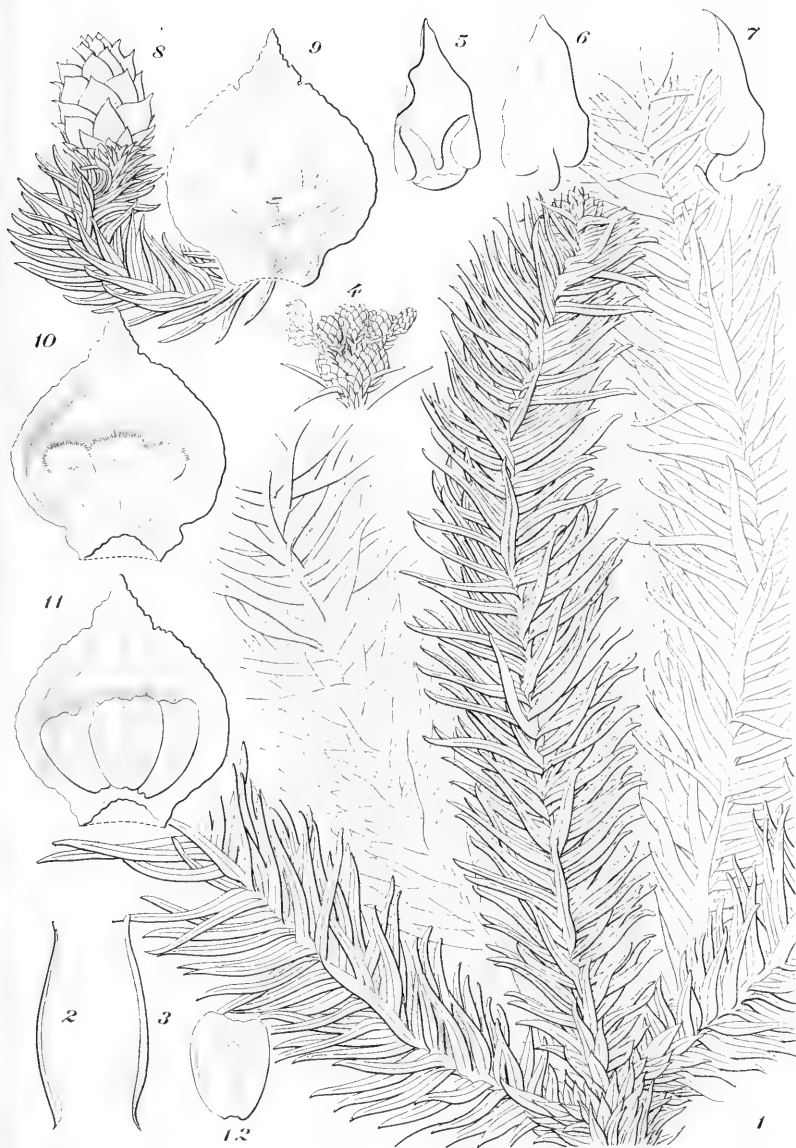
V.

PLATE XVI.

## Explanation of Pl. XVI.

*Cunninghamia Kawakamii* HAYATA.

- Fig. 1. Branches.
2. A leaf, seen from above.
3. The same, seen from below.
4. A cluster of male flowers.
- 5, 6, 7. Stamens, seen from different sides,  $\times 15$ .
8. A quite mature cone, (natural size), containing seeds with a perfect embryo, as given in the description in the text.
9. A scale, detached from the middle portion of a cone,  $\times 4$ .
10. The same, seen from within, seeds taken off, showing secondary scales.
11. The same with seeds.
12. A seed.





ICONES PLANTARUM FORMOSANARUM.

v.

PLATE XVII.

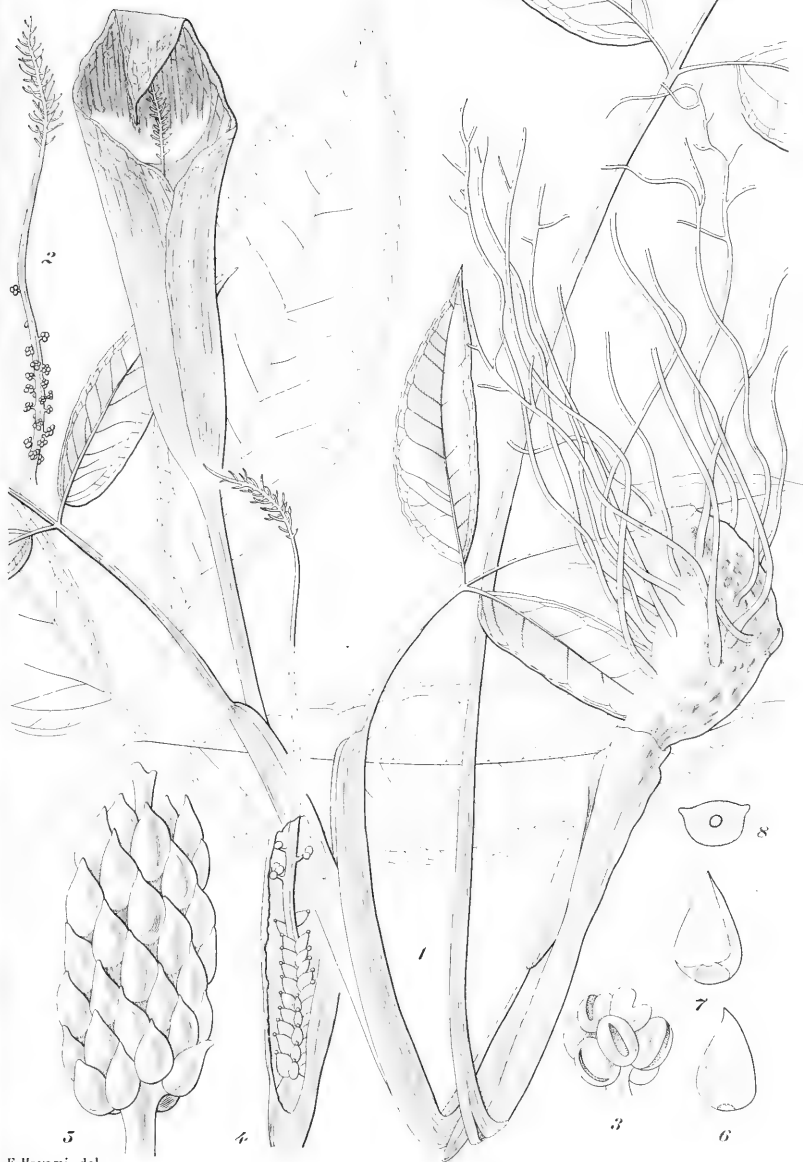
### Explanation of Pl. XVII.

*Arisema grapsospadix* HAYATA.

- Fig. 1. The plant.  
2. A male spadix.  
3. A male flower.  
4. A female spadix.  
5. A fruit-bearing torus.  
6, 7. A seed, seen from different sides.  
8. The same, in cross section.

Fig. 1, 2, 4, 5, natural size; fig. 3,  $\times 15$ ; fig. 6, 7, 8,  $\times 3$ .



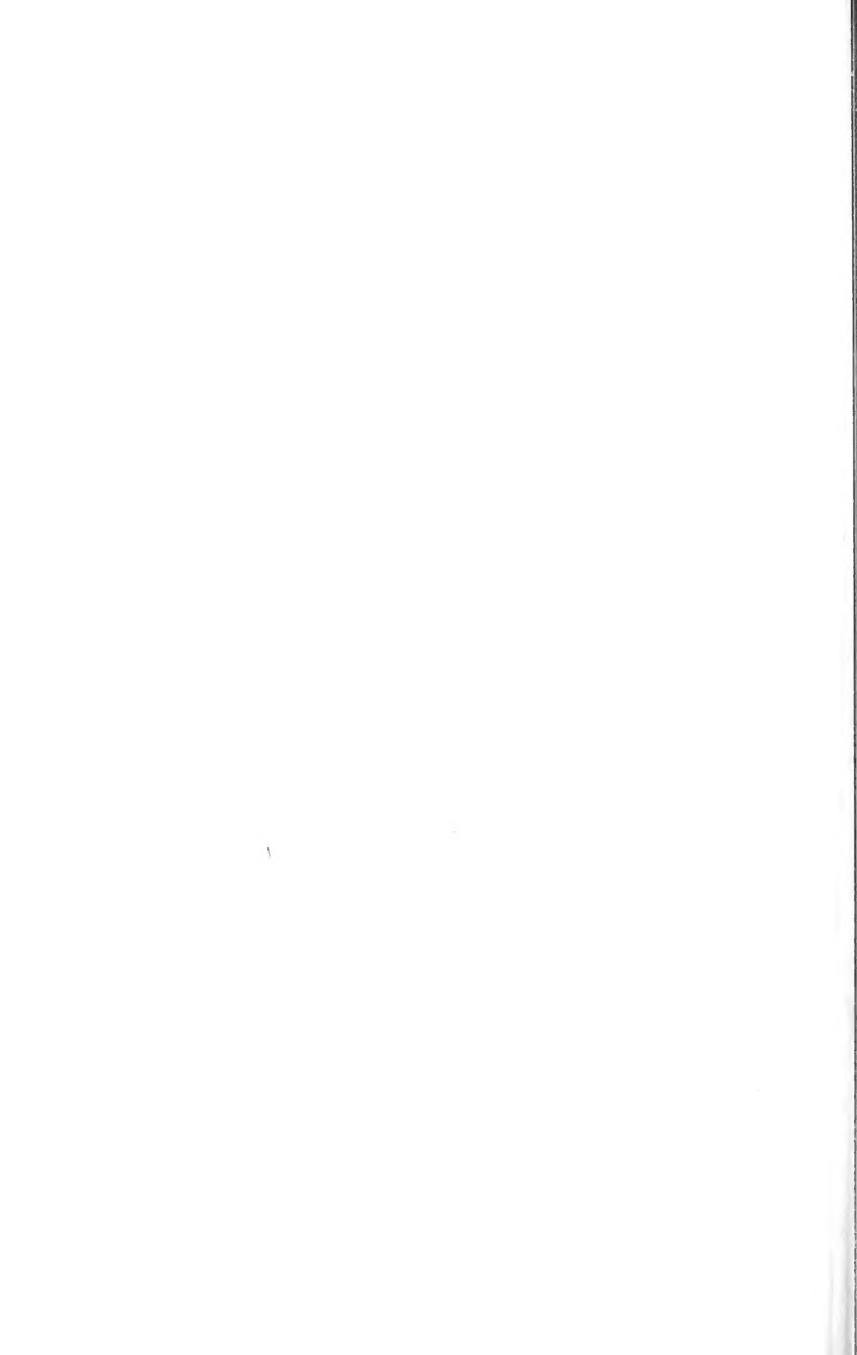












PLEASE DO NOT REMOVE  
CARDS OR SLIPS FROM THIS POCKET

---

UNIVERSITY OF TORONTO LIBRARY

---

QK  
369  
H3  
v.4-5

Hayata, Bunzō  
Icones plantarum  
Formosanarum

BioMed

